COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper   Second-class postage paid at Boston, Mass., and additional mailing offices

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Price: [illegible]/year   October 29, 1975   Vol. IX, No. 44

NEWSPAPER

Boston Globe Photo

Boston's Baseball Brouhaha

Fenway Park's left field line is 10 ft shorter than indicated on the ball park wall, according to a computer. See story on Page 4.

ACM '75 Speakers Say

DP Failing as Policymaking Tool

By **Edward J. Bride**
Of the CW Staff

MINNEAPOLIS – Despite all the benefits computers have brought to businesses, especially at the clerical level, automation has been a dismal failure in corporate board rooms and in creating public policy, several speakers said at the annual conference of the Association for Computing Machinery (ACM) here last week.

ACM '75 coverage continues on Pages 5, 6, 7 and 8.

Taking a cue from the keynote speaker, Alan Westin, who said computers had failed as tools in aiding high-level decisions and long-range policies, several panel members gave a rationale for these failures.

And it all boiled down to this: Politics, rather than rational or statistical motives, is the basis for most decisions in public policy.

Information systems are designed for the sake of maximizing existing programs, rather than for justice and equality, according to Kenneth Laudon of the Center for Policy Research and author of a new book called *Computers and Bureaucratic Reform*.

For example, the establishment of regional computer centers for New York's welfare data processing has made it more expensive and difficult to serve welfare recipients because some branch offices were closed as the regional centers were established, he noted.

The use of computers to trace delinquent fathers who were not paying child support amounted to "catching the poor, the penniless, the jobless," rather than serving some higher public goal, Laudon said.

The catching of "scofflaws" who avoid paying traffic fines, but who are now being traced

(Continued on Page 4)

Imsai Arrays Micros For Low-Cost Power

By **Ronald A. Frank**
Of the CW Staff

SAN LEANDRO, Calif. – IMS Associates, Inc. (Imsai) has combined multiple Intel 8080 microprocessors into an array configuration that can give sophisticated large-system users high processing capability at relatively low cost, the firm said.

Called the Hypercube, the microprocessor array is available in three sizes, each of which reportedly equals the processing power of a conventional system for approximately an order of magnitude less cost. The smallest Hypercube II contains 32 8080 microprocessors and contains processing power comparable to the IBM 360/65. It is housed in one 6-foot-high 19-inch frame and costs $80,000.

The Hypercube II contains 132 8080 microprocessors and contains processing power comparable to an IBM 370/195, according to the company. It is housed on two 19-inch cabinets and costs $400,000.

The largest configuration is designated the Hypercube IV and contains 512 8080 microprocessors. It is housed in eight cabinets and its processing power is beyond any commercially available system, the company said. It costs $1,280,000.

Each array contains logical nodes which have a system processor and a user task processor. A node can be connected to an external user task memory which can be an I/O storage device shared among several nodes.

Each processor in a logical node is actuallly a portion of a discrete microprocessor in the array which makes it almost impossible for a complete node to malfunction except in catastrophic cases, Imsai said.

An individual node can handle a maximum of 2M byte/sec of I/O volume which is described by the company as being equivalent to handling dual IBM 3330 disk strings per second.

But the Hypercube presently is limited to using 8080-compatible I/O devices which precludes the interfacing of IBM-type I/O subsystems.

The company's 108 intelligent disk system [CW, Aug. 13] can be interfaced to a Hypercube to provide up to 16 Calcomp Trident disk drives per array node. Terminals with RS-232 interfaces can also be interfaced to an

(Continued on Page 3)

Registered Non-Bell Modem Connected To Calif. Phone System Without DAA

By **Ronald A. Frank**
Of the CW Staff

SAN FRANCISCO – Late last week a non-Bell modem was connected to the telephone system in this area without a phone company Data Access Arrangement (DAA). The modem contained built-in circuitry which was certified and registered by the California Public Utilities Commission (PUC) as being functionally equivalent to a DAA.

The modem was certified by a registered electrical engineer as provided by the PUC in May of this year when it issued a general order outlining the procedures to be followed to eliminate the use of DAAs on intrastate services within California.

The first use of a registered modem occurred when a Hewlett-Packard (HP) 2644 CRT was connected to a phone line with a Vadic Corp. 3400 modem that had been approved for use without a DAA.

The CRT was being demonstrated for a user interested in the 2644 and data was transmitted to an HP 2000 Access system in Palo Alto, Calif. Data was also transmitted to an HP 3000 CPU to demonstrate a source data entry software package.

Certification of the Vadic modem was done by Gaines Crook & Associates, consulting engineers in Chatsworth, Calif., and a detailed technical report of more than 30 pages was sent to the PUC. One of the findings of the consultants was that "the network protection afforded by the [Vadic] 82050 DAA is as good as the 'Protective Connecting Arrangements' offered by the public utility telephone companies as protection against harm to the line." The approved Vadic modems have built-in DAAs which are functionally equivalent to Bell CBS and CBT units.

Both Pacific Telephone & Telegraph and General Telephone filed informal comments objecting to portions of the consultants' certification report. But these were not serious enough to halt registration of the Vadic modems, a PUC spokesman said.

Although the Vadic modems with built-in DAAs were found to comply with Bell System specifications designed to prevent harm, the consulting engineers recommended some additional circuit modifications.

These changes were described as conservative and were designed to make certain the Vadic modems with DAA-equivalents would meet the required protective parameters.

(Continued on Page 3)

Court Hears IBM Writ Request

By **Edith Holmes**
Of the CW Staff

NEW YORK – IBM last week told a special appeals court session its defense in the government's antitrust trial has been severely impaired due to "repeated arbitrary and unlawful actions" taken by Chief Justice Judge David N. Edelstein.

To remedy what it called "irreparable injury upon our capacity to present a defense," IBM counsel has asked the three-judge appellate court panel to grant a writ of mandamus [CW, Oct. 22].

For its part, the government asked the Second Circuit Court of Appeals to deny this request for mandamus on the grounds that the actions of the district court judge are well within his discretionary purview, particularly in a case of this size and complexity.

If allowed, the writ would amount to an order to Edelstein to vacate his orders imposing certain conditions on witness interviews and would limit his control of the filing of papers submitted by the parties and of particular guidelines for the filing of motions.

No mention was made in the formal remarks of either party about those papers filed by IBM with the second circuit which remain sealed. Relating directly to charges of misconduct by attorneys on both sides, these letters and affidavits by the lawyers involved brought some questions from the appeals court, but were dealt with only vaguely during the hearing.

Thomas D. Barr, lead attorney for IBM from the firm of Cravath, Swaine and Moore, spoke first before the judges, Ellsworth A. Graafeiland, Leonard P. Moore and Thomas J. Meskill. He argued there are two central problems in Edelstein's handling of the government's antitrust suit against IBM which prompted the petition for such an unusual writ.

The first of these is the chief judge's refusal to allow IBM to interview government witnesses

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OTHER EDITORIAL OFFICES: England: Computerworld Publishing Ltd., 140-146 Camden Street, London NW1 9PF. Phone: (01) 485-2248/9. Telex: 264737. **W. Germany:** Computerworld, c/o Computerwoche GmbH, 8000 München 40, Tristanstrasse 11. Phone 36-40-36/37. Telex: 5215350. **Asia:** Computerworld, c/o Dempa/Computerworld Company, Dempa Building, 1-11-15, Higashi Gotanda 1-chome, Shinagawa-ku, Tokyo 141. Phone: (03) 445-6101. Telex: 26792

Second-class postage paid at Boston, Mass., and additional mailing offices. Published weekly (except a single combined issue for the last week in December and the first week in January) by Computerworld, Inc., 797 Washington St., Newton, Mass. 02160.

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50 cents a copy; $12 a year in the U.S.; $20 a year for Canada and PUAS; all other foreign, $36 a year. Four weeks notice required for change of address.

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Computerworld can be purchased on 35mm microfilm in half-volumes (six-month periods) through University Microfilm, Periodical Entry Dept., 300 Zeeb Rd., Ann Arbor Mich. 48106 Phone: (313) 761-4700.

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Most Costs to Rise 4%

Honeywell Follows IBM in Price Hikes

By Patrick Ward
Of the CW Staff

WALTHAM, Mass. – The price of most Honeywell equipment is going up by about the same number of percentage points as IBM announced when it hiked its price three weeks earlier [CW, Oct. 8].

The purchase and monthly rental cost of most Honeywell equipment will rise 4% on Nov. 1. Some service and maintenance charges will also go up from 5% to 10%.

The price changes will be effective Feb. 1 for equipment already under contract.

Honeywell blamed the price hikes on the "continuing pressures of inflation and rising costs."

The purchase price increase will affect most large central systems and some peripherals in the Series 60 and Series 6000 lines. However, the prices of smaller Series 60 machines, the Level 61 and 62, are not going up. Neither are the prices of the peripherals exclusively used on those models.

Model 516 central processors, selected communications equipment and nonstandard hardware configurations are also going up.

Rental Increases

The rental price increases will affect the large-scale Series 60 Level 66 and 68 CPUs and most of the Series 6000 line. It will also apply to most Series 200 and 2000 CPUs, System 700 and Model 316, 516, 1642, 1644, 1646, 1648 and 55 CPUs, Honeywell said.

The 4% price rise also applies to most of the peripherals used on those systems, with the exception of peripherals exclusively used on the Series 60 Level 61 and 62 CPUs.

Data entry equipment, nonstandard products and some communications gear, excluding terminals, will also rise by 4%.

There will be a 2% rise in monthly rental for Model 636, 6023 and 6051 central processors.

Honeywell said maintenance charges on most of its computer equipment will go up by 9%. However, the Level 61 and 62 and Model 58 CPUs and some of their peripherals will escape the maintenance charge increase. So will some Honeywell communications gear and all the company's terminals.

Systems engineering and data services rates will be increased by 10%, and other program products by 5%, Honeywell said.

Appeals Court Reviews Writ Request

(Continued from Page 1)

privately before they take the stand, thus "daily prejudicing IBM's ability to cross-examine witnesses." Secondly, the corporation has been unable to protect the record in the lower court because the judge will not file IBM's papers or permit IBM to make oral motions in the course of the trial, Barr added.

'Shaky' Grounds

The IBM attorney provided the appeals court with two examples of instances where the defense felt Edelstein pushed aside crucial matters on shaky procedural grounds.

One episode related to the defendant's unsuccessful effort to have an order vacated which was issued by the judge in May and required a transcript be taken or opposing counsel be present when witnesses are being interviewed informally prior to testifying before the court [CW, Oct. 15].

The second instance referred to the district court's refusal to file IBM papers protesting a request by the government for additional discovery of IBM documents.

In this second case, Barr noted, "I will deal with this entirely in terms of technicalities because that is the way Judge Edelstein has dealt with the matter."

"These are two of the most recent and two of the worst examples of Judge Edelstein's misconduct," the IBM lawyer said.

Speaking on behalf of the government and Judge Edelstein at the request of the court of appeals, Bruce B. Wilson, chief deputy attorney with the Antitrust Division of the Department of Justice, maintained the extraordinary writ "should be used only where the district court has clearly abused its power."

Arriving last week from Washington, D.C., specifically for this hearing, Wilson said he couldn't think of a case in greater danger of "piecemeal review" than U.S. vs. IBM.

He urged the appeals court to leave the case in the hands of the district court for the time being, warning that if the second circuit granted IBM's petition for this write of mandamus, the judges could expect a flood of petitions from the defendant every time events aren't tending its way.

Harrassment of Witnesses Cited

Wilson argued further Edelstein has simply adopted these procedures to expedite a complicated and cumbersome trial. The order regarding the interviewing of witnesses, to which Barr concurred at the time it was adopted, was devised because the corporation was "harrassing" government witnesses, he noted.

Similarly, Edelstein's rulings concerning oral motions followed IBM's attempt to bring and to argue an excessive number of motions during the trial, Wilson added.

Stressing that the government, too, has been under the same restrictions IBM has had to deal with, the Justice Department attorney said that, even taken together, IBM's complaints "do not constitute mandamus material."

"We deny the district court has erred," he stated. "But even if Judge Edelstein has or does make some error, it is not the appropriate time for appellate review." There is no need for intervention by the appeals court at this point in a trial that is already going on, Wilson added.

Extent of Violations

Following his presentation, the appeals judges asked Barr to explain the extent to which he felt his client's rights had been violated by Edelstein's orders – beyond the instances cited.

Of Wilson, the panel demanded to know how an appeals court would know what papers had been presented by either party unless they were filed by the trial judge and so entered into the record.

Wilson was also asked whether he seriously considered the transcript procedure to be reasonable.

The appeals court also wanted to know how Edelstein, as the trier of fact in this case, had any right to review these transcripts of witness interviews – as he has on a least one occasion.

They asked whether Edelstein's action in this matter wasn't "tantamount to placing himself at counsel table."

The panel retired without rendering an immediate judgment on the matter.

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Imsai Arrays Microprocessors For High-Power CPU at Low Cost

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array node.

Each microprocessor in an array can be performed for an individual application in Intel 8080 Assembler language. Tasks are assigned to the system processor in a node which in turn selects a user task processor to carry out the function.

The three components of a logical node are made up of elements that are in contention for assignment and are drawn from one of the various microprocessors in the array.

Major Applications

Major applications of the Hypercube technology are expected to include online information retrieval systems with a common data base accessed by several hundred terminals, time-sharing networks and message-switching applications.

The array concept is also suited for array processing such as is done in the polling of instrumentation, process control and simulation, the company said.

Every "node" of the Hypercube has:

- An instruction execution rate of 1 million instruction/sec.
- A Direct Memory Access (DMA) capacity of 2M byte/sec.
- 16K bytes of user program memory – expandable to 64K.

Thus, the Hypercube III, for example, provides an aggregate instruction execution rate of 81 million execution/sec, a DMA capacity of 162M byte/sec and a total user program memory of 1.2M bytes (expandable to 5M bytes), the vendor said.

Hypercubes are supplied with the Hypercube Operating System (HOS), which resides entirely in firmware. HOS supports all associated I/O device controllers and provides for all internodal user and system communications.

Four-dimensional architecture gives eech node eight independent data paths to. HOS "assuring failsoft internodal communication," according to the firm. Any data path or communication link interruption is detected by HOS and a new optimum alternate path is selected with the break being appropriately reported.

HOS also provides facilities for a task supervisor to detect and report a node malfunction with reassignment of the task to a healthy node.

Maintenance of the Hypercube systems will be done by Sorbus, Inc. at about 1% per month of the purchase price. The first system is scheduled to be installed in Februery and will probably by a Hypercube III configuration, a spokesman said. Imsai is at 1922 Republic Ave., 94577.

	Hypercube II (Order 2)	Hypercube III (Order 3)	Hypercube IV (Order 4)
Aggregate instruction execution/sec	16 million	81 million	256 million
Aggregate programmed I/O capacity/sec	4M bytes	20M bytes	64M bytes
Aggregate DMA capacity/sec	32M bytes	162M bytes	512M bytes
Number of I/O device controllers attachable	96	216	384
Number of concurrently operating tasks	16	81	256
Standard user program memory size	256K bytes	1M byte	4M bytes
Optional fully expanded user program memory	1.2M bytes	5M bytes	16M bytes
Cost	$80,000	$400,000	$1,280,000

Imsai Hypercube Cepabillties and Cost

For State Systems

U.S. Relents on Dedication Issue

By Nancy French
Of the CW Staff

WASHINGTON, D.C. – In response to pressure from governors, state attorneys general and state information systems administrators, the Justice Department and the Law Enforcement Assistance Administration (LEAA) have backed off on insisting dedicated computers be used for state criminal justice information systems.

The proposed change to the original criminal justice information-handling rules, which went into effect June 19, was published in the *Federal Register* last Friday.

In issuing the proposed change, "the Justice Department and the LEAA have acknowledged a variety of configurations can be used to meet the security and privacy standards achieved by total dedication," a Justice Department spokeswoman said.

The change has placed within the state criminal justice agency the responsibility for assuring whatever computer system is selected for criminal justice information handling meets the security requirements established by the June 19 rules.

"As long as a computer system and its personnel is under the control and supervision of a criminal justice agency, almost any type of secure system will be accepted," she said.

Interested in Security

"We're interested in security, not dedication per se. Besides, every governor in the country is down our backs," the Justice Department spokeswoman said.

"In addition, technology has been changing, and we have become convinced there are means other than dedication that are equally secure."

Only the part dealing with dedication has been changed. All other sections concerning completeness and accuracy of records, limitations on dissemination and juvenile records for example, as well as personnel policies for those handling secure information remain the same.

Public hearings have been scheduled tentatively in Washington on Nov. 17-18, Nov. 21 in Atlanta and Dec. 4 in San Francisco.

Written comments will be accepted until Dec. 5, efter which federel officials will "digest end analyze" comments and witness transcripts to aid in writing the final regulation.

The amended regulation will go into effect in January or February.

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CW 1029

DP Helps Resolve Fenway Park Dispute

BOSTON – Using an aerial photograph and a computer, the *Boston Globe* newspaper finally resolved the dispute over how far it really is from Fenway Park's home plate to the left field fence, and it's just what everybody thought – quite a bit shorter than the posted 315 feet.

According to the *Globe*, the distance is actually only 304.779 feet, making Fenway Park's left field wall the shortest in the major leagues. It's even shorter than Baltimore's, where the foul line bounding left field measures only 309 feet from home plate, the *Globe* said.

Over the years, baseball players and writers alike have asked to measure it. Curiosity was heightened by Red Sox officials who refused to permit it.

So what does this all mean? Absolutely nothing, according to sports writer Monty Montgomery, whose buddy did the math problem as a favor.

While it may not mean anything, it was fun to talk about last week while fans waited longingly for overcast skies to clear and the World Series to get going again.

To do the calculations from the aerial photo dug out of the *Globe's* files, the mapping expert used lenses developed during World War II for aerial reconnaisance, simple trigonometry, a computer of undisclosed make and model and some "company time."

The unknown number was determined using known, undisputed distances that appeared in the same photograph, including the diamond's 90 foot sides, the distance to the visiting team's bullpen, which is 329 feet, and the distance to the intersection of the left and centerfield walls, which is 379 feet.

Any distortion caused by the angle of the photograph applies to the known and unknown dimension equally, the *Globe* said.

ACM '75 Speakers Say

DP Failure as Policymaking Aid

(Continued from Page 1)

effectively through computerization is another computer application of minor importance.

He also criticized the use of computers to detect welfare fraud by recipients, while little has been done to check up on the providers of welfare services, nursing homes, pharmacies, etc.

The closing of prisons is unlikely, despite DP-based studies which have blamed prisons for the high rate of recidivism, Laudon said. Prisons are "crime schools," but little will be done about this problem, at least until the politicians make some political, not scientific, decisions, he said.

Technology's Impact 'Trivial'

"No technical innovation changes the direction in which society is moving," Laudon said. Technology's impact on society is "trivial" in this regard, and things change when the public wants them to change, not when data can prove a point, he said.

Despite all these problems, computers can be used to help organizations avoid failures in making decisions, largely because computers facilitate sharing of data, according to Robert Kling of the University of California in Irvine.

This sharing of data and models can lead to more informed policymaking, Kling said. Other panel members were skeptical that representatives of two sides of an issue could or should cooperate, since they collect different data for different arguments.

Anthony Wasserman of the University of California, however, said two intelligent people given the same data can reach different conclusions. Furthermore, it is impossible to predict the issues which will be important in public policy, he continued.

"You never know what your influence is," according to Consultant Dan McCracken, who urged the audience to provide input to legislators. Decisions must be made with incomplete data, and therefore input from technicians is important, he said.

As one example, John Gentile, assistant postmaster general for management research at the U.S. Postal Service, cited the use of computers to determine routes for letter carriers.

Despite the fact information is "clearly documented," the unions fear the loss of 15,000 jobs and, therefore, implementation of this computer application is awaiting a final decision, Gentile said.

The Postal Service wants to close several thousand "fourth-class" post offices which are losing money, but Congress will not permit this, fearing repercussions from voters, he said.

"The numbers are there" on these unprofitable offices, but a final decision is "pending some compromise" with the Congress, Gentile said.

"The real world is not binary," he continued, noting most high-level decisions amount to "political compromise."

Modem Connected Without DAA

(Continued from Page 1)

One of the problems encountered by the consulting engineering firm during the certification tests was a difficulty in determining the characteristics of Bell DAAs. Since these units are made by the phone company, they have never been tested according to the strict parameters spelled out for non-Bell equivalents, Gaines Crook, president of the consulting firm, said.

Vadic has been producing the built-in DAAs for some time, although the installation last week marked the first approved installation at a user site. Previously these modems have been supplied to overseas users, but the California registration allows their use on intrastate links.

Similar proposals for the certification and registration of non-Bell modems are pending before the Federal Communications Commission (FCC) for interstate services. More than 28 companies recently sent comments on the proposals to the FCC [CW, August 6].

The Interconnection Office of the FCC staff reportedly is ready to submit its recommendations on the liberalized interconnection proposals to the commission. The project is said to have high priority with the commissioners, but no date has been set when the commission will vote on the issue.

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DPers Urged to Add Expertise to Automated Voting

By Molly Upton
Of the CW Staff

MINNEAPOLIS – Computer professionals should play a larger role in assisting local and state election officials with procedures for computerized voting, according to panelists at the Association for Computing Machinery ACM '75 session on computers in the electoral process here last week.

CW at ACM '75

State legislators and local government administrators need the expertise that computer scientists and specialists can supply to assure the security and accuracy of computerized elections and prevent the loss of public confidence in the results, Roy G. Saltman of the National Bureau of Standards (NBS) said.

David Dunbar, president of Computer Election Systems, Inc. urged computer people to help out by either writing programs to tally ballots, offering DP centers for counting votes or acting as official computer center observers during the counting process.

Thomas Harbron, director of the computer center at Anderson College, stressed the need for vote-counting programs with clear audit trails.

Saltman, who authored the NBS report on the "Effective Use of Computer Technology in Vote Tallying," said the principal element contributing to previous snags in electronic vote counting was management failures.

Technology and management are inextricably linked, he said, emphasizing the need for help from the computer community.

"The effective use of technology requires management control and the effective management of technology requires the utilization of appropriate technical expertise," he said.

Proper management could have uncovered and prevented most of the casual factors in previous vote-counting snafus such as human operational failure and technical failures, he said.

Expertise Often Unavailable

The NBS report concluded that the expertise necessary to manage advanced election technology is not available on the staffs of many local jurisdictions, Saltman said.

In such jurisdictions, vendors tend to conduct a significant part of the election on the jurisdiction's behalf and situations in which conflict of interest is a serious concern may arise if vote-tallying activities do not go according to plan, he said.

Saltman proposed a three-step process for operation of vote-tallying systems, beginning with acceptance of hardware and software for future use based on conformance with specifications.

The second step is the operational checkout of components, including any modifications necessary for a particular election, while the third step is the actual operation of the system during and after the election.

Improvements need to be effected in areas ranging from physical control over ballots, hard-copy computer records and storage media containing programs to provide for machine recounting of ballots on alternate, independently managed systems, he said.

Dunbar, whose firm makes vote-tallying machines, suggested computer professionals could write ballot-tallying programs, although most regions get these free from vendors.

Program Environment Needs Rich Language

By Don Leavitt
Of the CW Staff

MINNEAPOLIS – The real problem in the program environment is to find a language rich enough to express application logic and still retain control of the executing program, Charles G. Moore, vice-president of Cyphernetics, Inc., said here last week.

Admittedly playing the devil's advocate in an ACM '75 session on programming environments, he urged the other panelists to recognize the difference between the "programmers' environment" and the "program environment." The first is determined by room color, whether the programmer can work in batch or interactive mode and similar factors outside the program itself.

The program environment, on the other hand, is a tremendous intellectual complexity, entailing such elements as the programming language, the operating system, libraries, the real machine on which the work is to be done and compilers.

He noted that APL and Basic are relatively complete, closed systems. They can't be extended to cover apparently unique application problems, but the intellectual effort needed to work with them "fairly comfortably" is to read "the manual (period)."

More flexible languages, Fortran for example, can also be put to use on simple problems by reading manuals, but to use them effectively the programmer has to learn about file systems, operating systems and ultimately data representations at the machine level so that dumps can be "translated."

Evan L. Ivie of Bell Laboratories admitted the programming staff at his installation had had feelings of frustration with their environment. But the labs have overcome that problem to a large extent through development of a "programmers' workbench."

The major advantage of this workbench, he said, is that it puts development work on a unique computer system, separate from but linked to a number of different target CPUs normally devoted to production work. More than that, it provides the programmers with space to work, tools for development efforts and reference manuals.

The workbench machines are Digital Equipment Corp. PDP-11s accessed by terminals in the programmers' area and linked to a variety of IBM, Univac and Xerox CPUs. It operates under a Bell-developed operating system, Ivie added.

The intermediate development machines support almost all the development functions from functional definitions, design and implementation through testing and evaluation, installation and operations support and maintenance.

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Proper Use of Programming Methods Avoids Nightmares

By Don Leavitt
Of the CW Staff

MINNEAPOLIS – Mixing conventional and structured programming techniques in a single program creates a "nightmare," but used properly some of the newer techniques can have a big payoff, George P. DiNardo said here last week.

CW at ACM '75

Addressing an Association for Computing Machinery (ACM) session on software management, the head of information services at Pittsburgh, Pa.'s Mellon Bank said he is "confused" by various aspects of structured programming. Since his programmers depend on knowing what they're doing, he isn't going to impose new things on them without plenty of planning.

As far as he can determine, DiNardo added, "structured programming" is more a form of discipline than the imposition of a limited number of control structures. Despite the criticisms of some current languages, he feels "any of them can be used in the new spirit."

Wishful Thinking

Returning to specific programming concepts, he voiced a wish – obtusely directed at fellow panelist F. Terry Baker of IBM – for reports of quantifiable savings in development work that could be attributed to structured programming.

As far as he was concerned, he said, the Time-Sharing Option (TSO) symbolic debug facility – which has nothing to do with structured programming – has produced impressive results in his installation.

Altogether, Mellon trained 135 programmers in the techniques and gained more than 100% improvement in productivity. Resulting programs were all completed earlier than expected, largely because test runs were reduced 50% with the debug support, he said.

In any case, structured programming is only one tehnique a DP shop can use to improve its production, DiNardo said. Perhaps more important is the recognition that programmers really are creative and that managers are results-oriented.

Recognizing that, revamping the way a shop functions should start with top-down design and development, he said. Later, once the programmers see the clarity provided by the high level top-down approach, they will be more willing to work with top-down coding routines that are their part of structured programming.

Earlier, panel Chairman Leon Presser of the University of California in Santa Barbara outlined why he thought conventional approaches to software projects often went wrong. Basically, he said, there is too little visibility of what is actually happening in the development process.

To solve that problem, users have to define the historical information needed by various levels of management, the sources of that infomration and the tools and techniques needed to collect it, Presser said.

In many installations, he noted, historical data on previous projects is just plain unavailable. Beyond that, however, much of the accounting data that is used by some shops is inapplicable to the development of meaningful planning for later projects.

Managers have to be concerned with the cost and time required by various projects, as well as some measure of the quality of the products they generate. The organizational structure and methodology used in the old projects should also be available to provide perspective, Presser said.

This information should be available in a historical data base, in the computer center records, from the manager of the operation or from some of the workers. The data base approach might be the most objective, he suggested.

For managers with that kind of information available, the new techniques of stepwise refinement, production libraries, walk-throughs, inspection teams and structured languages might help, Presser said. Without the background, there is no way to know how well current projects are doing, he said.

Broad Privacy Bill Unlikely This Year, ACM Keynoter Says

MINNEAPOLIS – Although it's highly unlikely Congress will pass any broad legislation in the privacy area such as Bill 1984, there could well be specific legislation in several areas this year, Columbia University Professor Alan F. Westin predicted here last week.

Passage of the Koch-Goldwater Bill (1984), which would establish privacy regulations in the private sector, is unlikely because the Congress established the Privacy Commission and gave it a two-year mandate to investigate this and other issues, he said.

"It is unlikely Congress would prejudge the commission," Westin told a press conference at the annual meeting of the Association for Computing Machinery.

However, there could well be legislation governing the use of records in specific areas such as the Criminal Justice Information System, amendments to the Fair Credit Reporting Act, banking, and also possibly national health insurance, he said.

Observing the privacy issue has emerged from a decade of alarm and empirical studies into one of legislation, Westin said the public is recognizing it is hard for legislators to decide what boundaries to set. Emphasis is now on providing a structure of public standards on which to build up a case-by-case system of jurisprudence, he added.

Sammet Probing Roster Sales

MINNEAPOLIS – Admitting some embarrassment, the president of the Association for Computing Machinery (ACM) is trying to find out how anyone can buy the complete roster of the 30,000 ACM members while the ACM policy stated the roster is for the "personal use of members only."

At a member-officer forum held during the annual ACM conference here last week, Jean Sammet, noting "I have a red face" on this matter, said she would have headquarters staff investigate the policy and procedures surrounding the sale of the roster.

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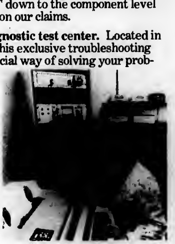

But Not All-Powerful Tool

DP Seen Increasing Efficiency of Power Structure

By Molly Upton
Of the CW Staff

CW at ACM '75

MINNEAPOLIS – Although computers have not been an agent for social change in the last two decades, neither have they served as an all-powerful tool for those using them over those who lack power, Columbia University Professor Alan Westin told attendees at the Association for Computing Machinery annual conference here last week.

Computers have increased the efficiency of the existing power structure, but their role has been as an extension of human facilities rather than as an instrument facilitating broad-scale decision making, as management information systems enthusiasts had hoped, he said in the keynote address.

Key issues confronting the world are societal in nature, he emphasized. While the effect of computers on issues such as privacy may be to intensify them, that effect will not be to generate dramatic change, he said.

DPers As Advisers

The principal role of computer professionals will be as advisers on how DP power can be used, rather than as independent controllers of that power, Westin said.

In contrast to some of the older professions such as medicine or law where services are administered on a personal basis, the DP professional is more likely to function as a hired expert or counselor, he said.

Society is increasingly taking upon itself the responsibility for solving Issues and turning to DP people to advise them on technical means to achieve its goals, Westin said.

Decisions regarding distribution of power, individual privacy, citizen participation and organizational decision making In government are affected and perpetuated by existing sociological patterns rather than by technology, as some had previously expected, he said.

Privacy Struggle

Even in the area of individual privacy, the basic struggle of the next decade will be "primarily a social policy conflict. The conflict will be between those offering a system maintenance approach to privacy designed to win subject acceptance of automated systems and a social reform approach that seeks to use privacy challenges to change standards as to who obtains the rewards of our society," he said.

DP has reinforced the patterns of data collection and access, and the intensification has made the issue of paramount importance in America. "But even without DP, American society was coming to grips with the idea of recordkeeping," Westin said.

For, although it was assumed in the '60s the inevitable effect of DP would be to collect more intrusive personal data about people, exchange it more widely among organizations and make individual access control more difficult, this has not been the case, according to studies such as the National Academy of Sciences' Project on Computer Data Banks, he said.

Similarly, the expected trend toward organizational centralization has not materialized to the expected extent since there are so many ways of structuring DP facilities using minicomputers and distributed processing. "Organizations can choose the degree of centralization; they are not prisoners of technology," Westin said.

Government Decision Making

Computer technology in government organizational decision making has had its main impact on day-to-day line operations, with the least impact on planning and management strategic decisions, as management information systems advocates had hoped, he said.

One of the reasons for this failure is "decisions are primarily based on political rather than purely rational" considerations, he added. Also, the tradition of departmentalism, federalism and other institutional tendencies has led to intractability of American dispersion of power, he said.

Another factor is the "absence during the past two decades of any major reorganization of American political institutions around which computer technology might have been organized," he said.

The battle for control of DP in organizations is deeply embedded in the structure of management, he added.

Westin was skeptical about the potential of computers to increase citizen participation through computer/communications technologies such as voting at home, town hall meetings and national referenda via electronics.

He termed this more a "preoccupation with a gimmick rather than an analysis of participation."

This use would raise fundamental questions involving the technical aspects such as who would control this type of polling mechanism? If it were the government, then it would have to be given far more power than it now has, he said.

If commercial enterprise were to control such a mechanism, Westin said he isn't sure he could see how the mechanism would increase the importance and quality of participation.

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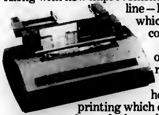

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Turing Award Winners Say

Computer Science Empirical Like Traditional Areas

By Don Leavitt
Of the CW Staff

MINNEAPOLIS – Computer science is an empirical discipline similar – in that respect – to many of the more traditional sciences. Each new machine, each new program is an experimental solution to the developers' hypothesis, according to the co-winners of this year's A.M. Turing Award presented by the Association for Computing Machinery at its annual conference here last week.

CW at ACM '75

The award was given professors Allen Newall and Herbert S. Simon, both of Carnegie-Mellon University, in recognition of their whole careers, according to the presenter, Bernard Galler, who noted their impact on current thought in areas such as artificial intelligence and list processing.

At the start of the Turing Lecture, Newall said machines and programs are normally created for preconceived, useful purposes, but "the fact is we can look inside and use them also as means of exploring theories of what is actually happening."

It was that interest in exploration that led Newall and Simon, along with John C. Shaw, to visualize and then develop the concepts of list processing, a procedure using pointers to data rather than the data itself for getting to information that is really needed by the problem to be solved.

Describing how he, Simon and Shaw devised list processing, Newall said they were interested in the processing of symbols, a deliberately ill-defined phrase meaning anything with a physical pattern that represents any idea or piece of information. The ability to work with symbols is a requirement of intelligence, he contended.

The professors' study led to the hypothesis that any system – human, data processing or otherwise – capable of generalized intelligence will be found on analysis to be an instance of a "physical symbol system."

Such physical symbol systems are almost universal machines, and perhaps because of this many people reject the basic hypothesis, he said.

But he traced the background of the hypothesis through symbol-pushing rules, the Turing machines of the 1930s, stored program machines that succeeded Eniac and on into list processing where the users' contact with his data – his symbols – is completely abstracted from the machine environment.

It may well be, he said, that computer science and psychology have identical interests, that humans are in fact physical symbol systems and that there should be a science called information processing psychology.

Searching for Solutions

For his part of the lecture – "we couldn't resist the temptation to finally share a podium" – Simon described how searching through possible solutions is an inherent part of the physical symbol systems Newall introduced.

He hypothesized that the solution to a problem can be represented as a symbol structure, and it is the function of a physical symbol system to generate and then progressively modify a set of symbols to reach the desired solution.

Searching for solutions is a sign of intelligence, he remarked, but the amount of searching is inversely proportional to the intelligence being applied to the problem. There are very few programs in any task domain that would be deemed more intelligent than really professional humans working on the same problem.

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DP Installations Have Five Lives Nolan Tells SigBDP

By a CW Staff Writer

MINNEAPOLIS – There are apparently at least five stages in the life of a DP installation, Professor Richard L. Nolan of Harvard Business School told a breakfast meeting of the Association for Computing Machinery's (ACM) Special Interest Group on Business Data Processing (SigBDP) here last week.

The stages can be recognized specifically by how the installation handles the classic management concerns of planning, organization and control and the building of an integrated application portfolio, he said. But the point of change from one stage to the next can be seen just by looking at the curve of DP expenditures over time.

The fifth stage is an extension of a four-stage hypothesis Nolan put forth just about three years ago. Though the nature of the first stages has now been pretty well confirmed in his mind, Nolan said the fifth stage's attributes vary with the goals of the installation.

Plotting expenditures over time generally forms an S-shaped curve, and the changes in angle of the curve mark the shift from high cost initiation into DP to rapid extension of services being offered, to imposition of controls and finally to a degree of integration of the entire DP effort with corporate life.

In that four-stage breakdown, the third stage – imposition of control – is when DP management often decided to hold the user accountable for the mess that exists in the application today.

Nolan recognized the fifth stage when he saw that the expenditures curve didn't always flatten out as he had expected. In many cases it paused, but then "skyrocketed" again just as in the first and second of the "old stages," he said.

Real integration of the DP function and the installation's organizational goals will occur during the fifth stage, Nolan said, if its determinant is a desire to get control of data resources, instead of just management of the computers.

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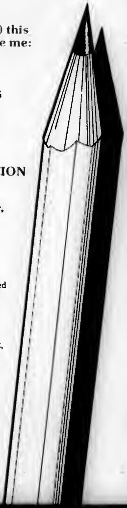

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'Mired' in Work, Pollution Agency Turns to DP Aids

By Ann Dooley
Of the CW Staff

CHICAGO – Mired under a heavy load of paperwork, the Environmental Protection Agency (EPA) is slowly implementing a computer system to help determine whether industries are meeting their pollution-reduction deadlines on time.

The Permit Compliance System (PCS) monitors reduction dates as specified by permit contracts issued by the states, but does not check the amount of effluent poured into the water.

Using an IBM 370/158, the system is geared to give regional and state personnel information on when dates occur so the state can follow up to see whether industries have complied with their schedules.

Carol Foglesong, head of the computer center in the Great Lakes Region, estimated some 10,000 discharge permits were put out by the states in her region. About 1,200 of those are of major concern since they account for 75% to 80% of the industrial pollution.

The system was begun in response to the Federal Water Pollution Control Act Amendment of 1972. This law stated that a discharger, either municipal or industrial, must get a permit to operate from its state. The permit is a contract between the state and the individual for various actions to regulate and reduce the amount of effluent put into the water.

Robert Schneider, Great Lakes coordinator of the PCS, said that until this year there was no centralized method of listing dischargers. Now all date-related information is gathered from the state-issued permits and put into the data bank.

"The system produces a series of computer flags to indicate to the compliance people the interim dates that lead to the final completion of the permit," Schneider said.

The PCS generates a printout indicating who has a major implementation due each month, and it is then checked to see that the implementation has been met.

An "abortive attempt" was made earlier in Region V to access a general source file which would include everything, Foglesong said.

"It tried to be all things to all people and was just too expensive and had too much information to work with. Our system now is more simple and easy to work with," she said.

Most of the states have their own system and because of their smaller size they are able to handle not just the date-related data, but also the amount of effluent they should be discharging according to their permits. In these cases the EPA is more of a watchdog to make sure the states are regulating the permits on schedule.

A similar system has been used to monitor the status of municipal efforts for some time. As with industries, only the major industrial and metropolitan areas are spot-checked unless a complaint is registered with the state.

If the improvements do not correspond to the computer dates, the EPA can take a series of actions. The first step is to send out a warning to the discharger. If no action is taken, a notice can be issued against the state, since the states have the primary responsibility under the law.

The third step is to refer the matter to the U.S. Attorney, who can collect a civil money penalty from the industry or, as a last resort, impose a jail sentence or a fine of $50,000 a day.

Usually the states take care of the matter at their level and action on the part of the EPA is not necessary.

Tampering Charge Leads to Guilty Plea By Former Policeman

By Nancy French
Of the CW Staff

CINCINNATI – Former Symmes Township Police Chief James Tygrett pleaded guilty to charges of tampering with computerized government records in Hamilton County Common Pleas Court here last week and received a six-month suspended sentence, three years' probation and a $1,000 fine.

Tygrett was indicted last spring for deleting a reckless driving violation from his record through a terminal of the region's law enforcement computer network [CW, March 19].

Until he admitted his guilt under oath, Tygrett maintained his innocence of the charges. He even took a lie detector test in Louisville, Ky., "as proof of his innocence."

During sentencing, Judge William R. Matthews emphasized it would be difficult for Tygrett ever to be employed as a law enforcement officer again, even though the charge was reduced from a felony to a misdemeanor through plea bargaining. (A felony conviction would automatically have disqualified him for police work in this state.)

Ironically, the former police chief lost his job in July when the township's police force was abolished in favor of police services provided by the county sheriff's patrol.

Tygrett is now self-employed, selling electronic games to cafes, sources said.

Five Others Cleared

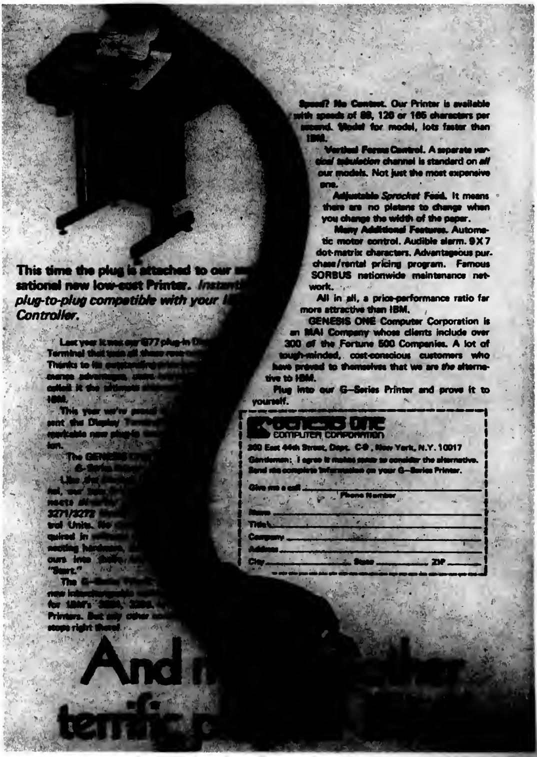
Carl Vollman, assistant prosecutor, said he was "pleased with the disposition" of the case because "we cleared the air of any suspicion that might have surrounded any of the other five people who had access to the computer terminal.

"A supertechnical case like this one is harder to try than a murder case," he added, "because a jury of 12 has to try to understand the function of the computer."

The computer tampering was discovered during routine inspection of a printout at a terminal where the reckless driving offense was originally entered, according to Andrew Atkinson, superintendent of the regional computer center that also serves area police agencies.

The terminal is part of the County Law Enforcement Applied Regionally (Clear), a shared system. As such, the system does not qualify for membership in the National Crime Information Center (NCIC) operated by the Federal Bureau of Investigation.

Had the county belonged to NCIC and observed that agency's standards, the tampering would never have been discovered since federal standards make no provision for security checks of audit trails, Atkinson said.



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MEMOREXCLUSIVE

Decade of the User Brings End to Closed Environment

By Toni Wiseman
Of the CW Staff

BOSTON – Data processing is in the decade of the user. Printers, terminals, voice response units and other equipment are all geared to teleprocessing and user-oriented functions.

In other words, this decade is a challenge for the DPer because he is no longer working in a closed environment, able to hide behind jargon and technical obscurities, Ted Rhodes of Associated Catholic Hospitals said.

It used to be that the DPer could go to a user's department and tell him if he fills in a form the DP department has designed – but which the user probably doesn't understand – he will get beautiful results, Rhodes said.

"But the walls of the DP room are starting to come down," he said. "DP is being forced to leave the DP facility as teleprocessing becomes a way of life. The DP manager is no longer in control of the data entry function, rather it is spread out into those departments the systems were originally taken away from."

Terminals are breaking open the doors of data processing, Rhodes said. By giving a clerk, supervisor or manager a terminal, you are giving him the power to get computer services.

What this means for the DPer is he now has to be more aware of the user's problems and functions. He can no longer hide behind jargon; he has to speak the user's language.

User Provides Money

Why? "Because the user is the one who is going to provide us with the money for new systems," Rhodes said. "And if we don't meet his needs, the user will go out and get his own turnkey system which he doesn't need any DP knowledge to run, and the data processing department is left in the cold."

Rhodes noted that, with teleprocessing, a whole new realm of problems is opening up for the DP department.

For instance, if there is a system failure, one can no longer simply go to the head office and report it. Now everyone knows, and within minutes every available phone is ringing wanting to know when the system is going to be up again.

"This means we can no longer train the user by simply telling him what code to punch in and then promising him beautiful results," Rhodes said. "We have to make him understand just how sophisticated the system is and that you don't have complete control over it any more.

"If he complains about poor response time at a site 100 miles away, you have to explain about pushing an electron 100 miles down the line, pulling down a program and finding a file before a response can be returned."

"The user has always been the key to the DP industry's growth," he said, "and now we're finally recognizing that what we need to succeed in this, the user's decade, is not management commitment, but user committment."

The industry is going to operate with the same equipment it's had for the last five years, Rhodes said, but it is going to be clustered differently, and the user, not the DP department, is now the focal point of the system.

Managers Should 'Deal With People'

By Ann Dooley
Of the CW Staff

BOSTON – It is more important for managers to deal with people than with computers, Emile Thibault of the Department of Public Safety for Massachusetts, told a group of DP managers here recently.

The ability to relate to others was ranked as the most important quality in a recent survey of managers from more than 130 corporations, Thibault said. The satisfaction of doing good work was ranked highest by 20%, and 17% ranked the contribution made to the company as the next most important, he said.

"People considered the quality of their jobs more important than their salary or job security," he said.

A successful manager has to become more aware of the planning stage, Thibault said. The manager must use long-range, tactical and operational planning to be successful, he said.

Thibault believes that future goals must be considered as well as the less-than-five-year goals of new installations and also daily routine functions. Money, manpower and materials must be managed efficiently and creatively by the manager, he said.

Three Kinds of Managers

There are three kinds of managers, Thibault told his audience. "One is a dictator, another is a 'great guy' and the third is somewhere in between," Thibault said. The dictator works on a vertical structure. The job gets done just as it is told to get done. Management skills get lost as well as initiative and motivation, he said.

The benevolent manager assigns a team to cover a special project. "This will create a 'gung-ho' group that doesn't have a 9:00 to 5:00 kind of outlook, but a group that is willing to do whatever is necessary to complete its project."

The third group is moving over to the benevolent approach and is still a mixture of both. Thibault said the kind of people and the organization determine which method works out best.

The most effective manager should look at staffing and job assignments and he should delegate authority and coordinate objectives, Thibault said.

"People can be motivated by having their basic needs fulfilled," he said. "People need to feel they're achieving and are being recognized for it. They want responsibility and interesting work."

The manager can help to achieve this, he said, by "explaining the big picture. A rule to follow is to train people to do a job as well as you, the manager, could do it, and they will push you up the management ladder," Thibault said.

DP Facilities Leading Change in Working Styles

By Ann Dooley
Of the CW Staff

BOSTON – The daily grind of 9:00 to 5:00 is going through a radical change in some computer installations, according to Pat Kinney of the Massachusetts Blue Cross and Tom LeGore of the First National Bank, who explained their revised systems here recently.

The Blue Cross has a three-day work week consisting of a 12-1/2 hour day with an hour off for lunch. "Working on this kind of schedule, the computer staff has better morale and there is less fatigue," Kinney said.

The staff is split into four shifts; A and C shifts work from 7:30 a.m. to 8:00 p.m., and B and D shifts work from 7:30 p.m. to 8:00 a.m. with a shift differential of 10%. Every fourth week one shift must work on Sunday. In this way the computer room is kept running six days a week.

Vacation days are similar to the old method, but the computer staff gets only seven holidays instead of the usual 11 days.

The salaries weren't reduced although the staff works less time than the rest of the company. The usual work week is 37.5 hours, while under the new method the week is 36 hours.

When the changeover occurred, the staff was not given the option of staying on the old schedule, and only one person quit because of it, Kinney said.

"There were really no problems when we changed; it was a boost to morale. Absenteeism went down because there were less days to get sick and everyone has a mini vacation every week," Kinney said.

The First National Bank operates under Flextime, Tom LeGore explained. Flextime is a program where the employees work when they feel best able to.

The employee must be at work from 10:00 to 11:00 every morning, but other than that, he can come in whenever he wants to, LeGore said. A certain mandatory amount of time, called core time, is required of employees, but when they put their hours in is their decision.

A minimum staff of five people is required to be there at all times and in scheduling it is hard to avoid a front-end load, LeGore said. "Everyone wants to work early mornings and early in the week. No one wants Friday, and Friday afternoon is the worst time of all," LeGore said.

Under this system people are more willing to get to work on time and not leave early, LeGore said. "Our productivity is up 10% and everyone is happy; no one would trade the program for a structured work week," he said.

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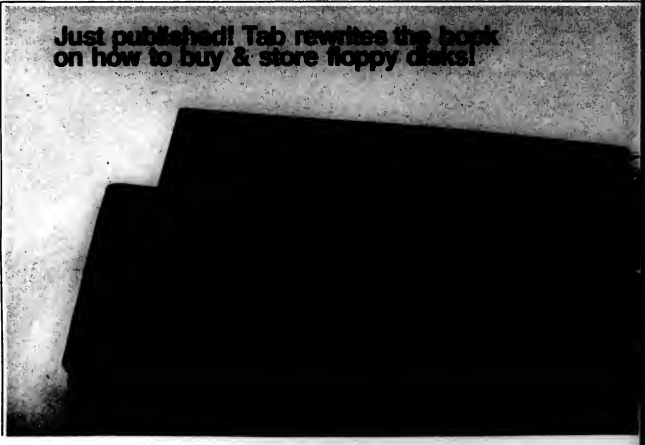
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After 10 Years

FAA Completes DP-Based Radar Program

By John Hebert
Of the CW Staff

WASHINGTON, D.C. – The Federal Aviation Administration (FAA) has completed its 10-year program of computer-based processing of radar information at all 20 air route traffic control centers (ARTCC) in the U.S.

Commissioning of the radar data processing (RDP) operations at the Miami ARTCC recently marks completion of the second phase of FAA's National Airspace System (NAS) Enroute Stage A program.

This last center with fully operational RDP under the FAA program is "a milestone in the agency's efforts over the years to provide safe and efficient use of the nation's airways," James E. Dow, acting administrator of the FAA, said.

RDP provides for direct readout of aircraft identity, altitude, weather and other flight data on air traffic controller's radar scopes.

Alphanumeric Tags

The RDP information is presented in the form of alphanumeric data tags which represent transponder-equipped aircraft flying in any ARTCC's airspace sector.

Formerly, controllers had to get much of this information through radio contact with the aircraft, write it on plastic markers and move these manually across the screen.

The first phase of the program introduced the use of computers and associated equipment for the automatic processing and transfer of flight data from one center or facility to another. This phase has been in operation at all 20 centers since February 1973.

Each RDP system depends on three major elements: the radar digitizer, developed for FAA by Burroughs Corp., the central computer complex, composed of an IBM 9020 system, and channel display systems developed by Raytheon Co.

The radar digitizer is located at remote, long-range radar sites and includes a radar processor, data receiver group and a random-access plan position indicator.

The digitizer accepts input data from primary search (long-range) radar and secondary search (beacon) systems, and also directly from aircraft equipped with altitude-reporting transponders.

It translates this information into a digital format and routes the information to the computer systems at ARTCC by telephone lines or microwave links.

After the information is received at the en-route air traffic centers, it is processed and correlated with basic flight plan information to provide integrated traffic and weather information for each control sector.

Accommodates Changes

The technique for handling flight plan information from sector to sector along each flight path accommodates changes that occur during flight. The computer system accepts a basic flight plan and calculates the detailed route of flight.

Flight path changes are entered into the system by the controller on an IBM 1052 printer console keyboard.

A continuous flow of radar and transponder data is automatically fed into the computer, as are forward flight plan messages from other centers. The system in Miami is linked to the systems in the Jacksonville, Fla.; New York; and Houston centers. This real-time computer-to-computer link reduces the voice communications required of controllers in passing flight information between various centers.

There are 35 program elements grouped into four subsystems to process digitized data sent from the radar sites. These programs create in memory a representation of the flights and weather phenomena in the area of the center. They also maintain flight identity, heading speed and altitude. Flight progress is predicted to help identify radar signals.

The RDP programs accept and check radar, transponder and weather data. The slant range and azimuth are derived for each aircraft and these are converted to X-Y coordinates. Since an aircraft is monitored by more than one radar as it approaches a different control sector, the programs compare and select the best signal.

The aircraft and weather information logged by the system is sent to a display system which creates individual display images for each controller by selecting specific sector information.

The control center's display systems, composed of Raytheon computer display channels or radar display subsystems, are the final RDP links which give controllers an accurate, three-dimensional look at air traffic.

The IBM 9020 pictured here at the air route traffic control center in Miami will process, track, control and display pertinent data on incoming and outgoing flights.

Radar Display Subsystem

Fifteen of the ARTCC use a computer display channel, and five of the centers use a different system called the Radar Display Subsystem (RDS). RDS incorporates plan view displays, which are identical to the displays used with the display channels.

Computer-generated alphanumeric tags on the controller's plan view displays track flights through the ARTCC sector or control area.

The tags not only identify each flight, but also provide the controller with supplementary data processed by the computer system.

This supplementary flight information is printed on flight progress strips, which are then manually arranged in sequence in racks alongside the radar scopes.

For transponder-equipped aircraft, the alphanumeric tags include a continuous readout showing both the actual and assigned altitude of each aircraft.

The RDP system has been criticized in the past for having hardware and software bugs as a result of an alleged rush to make the RDP system operational [CW, May 7].

"There is no way in which [RDP] is jeopardizing the safety" of airline passengers or personnel, an FAA spokesman said, commenting on the allegations.

Agency Tests Automated Flight Plans

WASHINGTON, D.C. – The demand for flight services is straining current manpower resources and is expected to triple by the early 1980s, the Federal Aviation Administration (FAA) said here recently.

For this reason, the FAA has been conducting pilot self-briefing experiments to see whether computer systems can be used to supply pilots with vital flight plan information in anticipation of a computer-based national briefing system.

The FAA has digested recommendations from some 1,200 pilots who tested the system when the self-briefing experiment was brought to 14 locations around the country last year and has made appropriate program changes.

Seeking Final Comments

The revised briefing experiment has been taken to air carrier and general aviation pilots in Boston, Denver and Chicago areas to get final comments before beginning work on the final design of a national briefing system.

Under such a system, the flight service specialists would serve as backup to the automated equipment and be located at "hub" flight service stations to which the remote self-briefing terminals would be linked.

The terminals consist of a display screen on top of a keyboard. By punching out the appropriate entries on the keyboard, a pilot can retrieve from the "hub" computer essential meteorological and aeronautical information – such as weather maps, weather advisories and notices to airmen (Notams) – and have it displayed on the screen.

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Editorials

Implications of Accountability

The concept of defensive DP raises some ominous implications for the user [CW, Oct. 22]. As put forth by attorney Ronald Winkler, future legal cases involving breaches of DP security will rest heavily on whether the owner of the DP system took the necessary precautions to comply with current legal requirements.

This idea of putting the burden of proof on the initiator of a service has spawned a new term in our society, "accountability." A popular application of this concept is the proliferation of malpractice suits in the medical profession.

But closer to our industry, the consumer groups have demanded their own brand of accountability of the supermarkets that have installed automated terminal systems.

As potential breaches to individual privacy become more serious, the law attempts to prevent them. The result of this attempt at legal protection for the consumer has a profound affect on our society and its legal system.

Professor Kenneth Boulding, director of the Institute of Behavioral Science at University of Colorado writing in the current issue of the *MIT Technology Review*, said we are witnessing a shift from the historic *caveat emptor* (let the buyer beware) to a new *caveat vendor* (let the seller beware).

In the process of establishing legal protection for the consumer, we are bound to get court cases that will have to distinguish between honest mistakes and deliberate evil. And Boulding correctly pointed out that "the sanctions against evil are too severe that they may be applied against honest mistakes . . . "

It now becomes the duty and obligation of those of us familiar with DP systems to show the legislators how data security and privacy can adequately be safeguarded.

Opening the 'Gag' Rule

IBM is currently trying to get the federal judge hearing the government's antitrust case against it to lift a so-called 'gag' rule barring either IBM or the government from talking to the press.

This is strange since the rule was instituted at IBM's request over three years ago.

Many publications – including *Computerworld* – fought against the rule at the time it was instituted, since it effectively prevented those with the most knowledge about the case from expressing their views. The Department of Justice also opposed the move, although not vigorously.

However, the order has now been in effect for three years and IBM's motives for wanting it lifted now should be examined with care.

The firm has a large contingent of public relations personnel and a huge advertising budget that could be used to try to convince the public the case against it is unwarranted.

Using these resources – which far outweigh anything the government could muster – IBM could take its case to the public, skirting the court and building public sympathy for its position.

Apparently the rule suited IBM in the early rounds of the case, but now it is ready to 'unleash its publicity barrage.

The company, however, can't have it's cake and eat it too: The court should not institute orders and then rescind them just to meet the tactical objectives of the firm.

Since the firm wanted the order three years ago, it should live with the consequences now.

'Now All Together, Separately . . . '

Letters to the Editor

Decision to Treat HEW as Agency Based on Some Unreported Facts

The Oct. 1 editorial, "A Sad Commentary," was indeed a sad commentary on the ability of the *Computerworld* editorial staff to fairly and objectively present the facts surrounding the issue – the Department of Health, Education and Welfare's (HEW) treatment of itself as an agency for Privacy Act purposes.

Although the associated article on page 1 partially dealt with the reasons for the decision, it also lacked objectivity and did not include pertinent information.

While internal recordkeeping was a consideration, there were other factors which weighed more heavily in the decision-making process.

Legal guidance from both the Office of Management and Budget (OMB) and the Justice Department opined that the treatment an agency conferred upon itself for Freedom of Information Act (FOIA) purposes would be a reasonable guide for Privacy Act purposes – HEW has always considered itself to be "the agency" under FOIA.

Justice cautioned that, whatever the choice, the practice that followed must not be so invidious as to frustrate the purposes of the act.

While Justice had in mind just the concern expressed in the editorial, the purposes of the act might also be frustrated by the indiscriminate application of the exemption provisions of the act or the approval of routine uses that serve purposes which are incompatible with the originally intended use of the information in question.

Given the existing internal controls on transfer of information by both regulation and administrative procedures, the use of these "loopholes" by the "11 agencies" of HEW are far more serious and potentially damaging.

Treating HEW as one agency has placed the secretary in the position of controlling these and other potential abuses and assuring that the Act is uniformly applied and administered throughout the department.

We have expressly addressed the matter of internal "need-to-know" disclosures through the inclusion in our system notices of a description of circumstances under which such disclosures will be made and by publishing, in the *Federal Register*, HEW-wide standards of conduct which hold the official responsible for maintaining the information accountable for assuring that any such internal disclosures are legitimate.

The specter, in the editorial, of massive exchanges of data between the Social Security Administration (SSA) and the Office of Education (OE) was unfounded. It completely disregarded the existence of SSA's regulation No. 1, which has governed its disclosure practices since 1937.

There are other restrictions on the internal transfer of information which CW overlooked.

More often than not, the disclosures for which we will no longer keep an accounting will be administrative in nature. For example, HEW's central payroll system operated by the Office of the Secretary will not record biweekly exchanges between it and what CW characterized as HEW's "11 agencies." Surely, there is nothing insidious in the desire not to be burdened with maintaining records of this type of "need-to-know" disclosure.

Thomas S. McFee
Deputy Assistant Secretary for
Management Planning and Technology
HEW
Washington, D.C.

IBM Could Desensitize Fraud Data

Alan Taylor's column, "Releasing Statistics Could Aid DP Fraud Prevention," [CW, Oct. 8] included summary statistics on incidents of computer fraud not reported to law enforcement agencies. These statistics were reportedly conveyed by IBM's manager of security, Robert Courtney, and subsequently discounted by IBM.

As director of DP security for my firm, I agree with Taylor detailed knowledge of the specific cases would be helpful in guarding against similar crimes.

However, I must disagree with Taylor's concluding challenge to IBM to release the information they have on these frauds because "it would greatly help everyone and wouldn't hurt you [IBM] either."

First, although information on how these crimes were committed would be helpful to me and others with similar responsibilities, we must recognize that broadcasting such information might also "show the way" for some others to make similar attempts, particularly in light of the reluctance on the part of the "injured" firm to report such crimes.

Secondly, I question Taylor's conclusion that releasing such data would not hurt IBM. Here I must make two assumptions: (1) The injured firms themselves had reasons for not reporting the crimes against them. These probably can be summed up as fear of adverse publicity. (2) IBM's awareness of these cases probably stems from its vendor relationship with the firms and, as such, it properly feels it is dealing with privileged information.

A solution is for IBM to depersonalize the crimes, classify them into categories, describe each category or type, the frequency of occurrence, range and average amount of loss, etc.

This desensitized information could then be incorporated into its security seminars for customers or otherwise made available to customer management.

James A. Schaaf
Detroit, Mich.

(Other Letters on Page 16)

Allan Douglas Maxwell

Just about everybody in our curious trade has a story to tell about someone who influenced his career: a first contact in fancy electronics, a computer science professor, a friend who enjoyed working in data processing, a boss early in his working history.

This column is about one of the two men who opened doors for me. They didn't shape my personality; like Leroy Brown in the popular ditty, I was "meaner than a junkyard dog" when I was in grade school! But by example and by direct help, they steered me into the future. One of the things I hope for most is to have done the same for some of the young men and women I've taught and worked with.

Why today? Well, it's an anniversary: almost exactly forty years since I put finger to calculator button, under the aegis of a remarkable astronomy professor named Allan Maxwell.

Nearly a century and a half ago, a computational giant named Oppolzer produced by half a lifetime of logarithmic effort (the sort of thing Babbage wanted to eliminate) the canon of solar eclipses for the years up to 2001. It is still used today, albeit with better positions of the sun and moon worked up by modern machinery. Oppolzer had one disciple, an enthusiast for asteroid and comet orbit calculation named Otto Leuschner. Leuschner emigrated from Germany and became head of the Students' Observatory at the University of California at Berkeley – not to be confused with the Lick Observatory. Leuschner in turn had a young disciple who applied his novel orbit computing algorithms and who came in the late 1920s to Ann Arbor to teach astronomy in his turn.

His name was Allan Maxwell. He was the son of a streetcar conductor in Woodland, California, and with scholarships and hard work he acquired a good Ph.D. and a burning enthusiasm for an old and abstruse part of science: orbit determination and perturbation calculations. He worked first with addition-subtraction logarithms – Leslie Fox, director of the computing network at Oxford, and I had a long debate decades ago about which of us should be regarded as the last victim to use them! When I met him in the fall of 1935, as teacher of my first professional-level course in astronomy, Maxwell had just purchased with his own savings a fancy new Marchant electric desk calculator. Much later, in the forties and early fifties, he had access to primitive electronic equipment – the 650 sort of thing. He found it cold, impersonal; to the end of his life he preferred to massage the intricate calculations of his specialty with his own hands – with forms and special tables of his own, often rather peculiar, devising.

He seized on me as a young brand to be saved from the burning of astrophysics and put me to work on a series of orbits of a tiny asteroid just discovered by a Belgian astronomer, which had approached the earth more closely than any other object (except meteors) observed up to that time. Over the next years he taught me a great deal of highly practical, energy-conserving numerical analysis and gave me the desire for artistic and nonwasteful use of computing power and time that has influenced me strongly ever since. He was greatly concerned with standards: wanted all astronomical computers around the world to use the same symbols and work to an agreed accuracy.

He had willingly taken a vow of poverty, as scientists usually had to do in those days; he not only bought his own calculator, but paid his own way to meetings (and mine too, on several occasions). He wanted a disciple, and I was it; Alas! I disappointed him by not having one in my turn – at least, not in astronomy.

He was devoted to the idea of accurate and efficient and useful calculation. He was poised on the brink of a revolution in methodology that made his detailed and hard-won skills obsolete. But his concern for quality, and his desire to help young people enter a world of ideas that he loved – those things live on.

Herb Grosch

Auditors Should Investigate

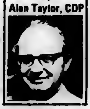
Overcharge Errors Can Bring Fraud Dangers to Light

Another case of possible fraud funding which could be checked by alert internal auditors came to light as a result of a $360.47 airline ticket, 016:4459:972:404, sold by United Airlines on Sept. 11 to Don Weimer, a Columbus, Ohio, DP director.

The Taylor Report

By

Alan Taylor, CDP



The ticket, produced by United's Apollo reservations systems in Denver, Colo., included a $42 charge for a night coach flight from Atlanta, Ga., to Columbus, Ohio, on board Delta Airline's Flight 682 on Sept. 14.

This is an incorrect computer output. If Apollo had asked Deltamatic (the equivalent Delta computer system) about Flight 682, it would have found out that 682 doesn't provide night coach service between Atlanta and Columbus. The Deltamatic system, situated in Atlanta a few miles from the airport, knows that Flight 682 provides night coach service only as far as Dayton, Ohio. True, 682 flies to Columbus, but the Dayton-to-Columbus leg is a day flight, not a night one.

Under current rules, night flights can be booked as far as Dayton, but then a separate day flight ticket is needed from Dayton to Columbus. It is, in fact, cheaper to purchase a day-rate coach ticket from Atlanta to Columbus than a night-rate Atlanta-to-Dayton ticket plus a day-rate Dayton-to-Columbus ticket.

Two Mistakes

On the surface, therefore, the sale of the $42 ticket was a mistake which benefitted the customer because he wasn't asked to pay the more expensive day rate between Atlanta and Columbus. However, the flight being booked was not just Atlanta to Columbus, but was Las Vegas to Columbus. Atlanta was just a point at which Weimer changed from Delta Flight 986 to Delta Flight 682.

United's Denver computers, too, failed to recognize this fact and treated the Las Vegas-to-Atlanta flight as a completely separate flight from the Atlanta-to-Columbus one. This second mistake cost Weimer $41 dollars in an apparent overcharge since the night flight coach ticket from Las Vegas to Columbus is $110, while the sum of the night flight Las Vegas-to-Atlanta and Atlanta-to-Dayton tickets is $151.00.

Fraud Danger

What I am concerned about is that the ticket, issued by the computerized system which Glen Belden, United Airlines president of computer and communications services on Sept. 10 had assured me was an eminently good system, illustrated a method whereby frauds could be funded.

Potential overcharge situations, like the Atlanta interconnection or the night/day service change at Dayton, can easily be located by insiders, and overcharges that are not detected by customers can, after a suitable interval, be diverted in some way.

Weimer, for instance, would not have known about the overcharge except that his secretary had previously used the office airline guide to cost out the ticket at $319.47 and told him about it.

Internal auditors should be aware of the fraud-permitting situations involved in computer overcharges, not merely on airline tickets but also many other situations. Obviously, auditors' access to the books will allow them to determine whether overcharges are occurring and should result in an investigation as to whether the fraud-permitting situation (unclaimed overcharges) is also occurring.

What to do then is an auditing and management question, but at least routine auditor action would permit those professionals to avoid being called useless in handling the current plague of computer-related frauds.

The auditors' reports, of course, to be effective, should suggest some specific action that could help the situation. In many cases, and certainly in this case, it isn't impossible to do this, even without a detailed knowledge of the system.

Hidden Giveaway

The giveaway to the Weimer overcharge is shown on his ticket in the left-hand box. This column head is simply "X/O," and on the Weimer ticket, the Atlanta to Columbus flight is marked "O." It should have been marked "X," as Atlanta was simply a changeover, not a destination.

Weimer didn't know this, because someone had decided that this box, and only this box out of the 27 labeled boxes on the ticket, would not be explained to United's customers. Presumably the explanation, if one could ever find the person responsible, would be there was no room in the heading for any explanation. This, while technically true, is also technically (from forms-design considerations) an inadequate response.

There may not be room over the column, but there is room on the ticket. Specifically, there is room available under the fare-calculation box which could be used to explain the difference between "X" entries and "O" entries (Figure 1).

Probably there are better ways that will suggest themselves to you, but all that is important is that there is certainly something that can be constructively suggested by the auditors when they find cases of overcharging by computers.

Like the situation with the overzealous computer in St. Joseph Mercy Hospital [CW, Oct. 1], the Weimer overcharge illustrated how auditors can follow up on comptuter errors constructively, giving us all better, more controllable systems which won't be as open to fraud as they currently appear to be.

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NAME OF PASSENGER							
X/O	NOT GOOD FOR PASSAGE	CARRIER	FLIGHT	CLASS	DATE	TIME	STATUS
	From						
	To						
	To						
	To						
Fare		FARE CALCULATION					
Tax							
TOTAL		Note: Connecting flights (shown by an "X" under "X/O") are normally cheaper than independent ones. Ask for details.					

Figure 1. In the standard airline ticket design used by United in issuing the Weimer ticket, there is an unused line just under the fare-calculation box. By inserting a message in this area which explains the important but currently unexplained "X/O" column on the left of the ticket, the impact of potential errors leading to overcharges could be reduced. One possible form of the message is shown above.

Letters to the Editor

PL/I Preprocessor Offers W-2 Solution

Although I agree with H. Richard Winkler about the Internal Revenue Service's changes in the layout of the W-2s each year being a nuisance [CW, Sept. 24], we have found a solution.

We use the PL/I preprocessor to make the changes to the W-2 print program. All the programmer or clerk has to do is to code up a W-2 print format form.

This form contains the spaces for the data neme or literel you want to print (Social Security number, gross amount, etc.), line number, column number and the format of how it should be printed (ZZ9, XXXXX, etc.).

This coding takes about 15 minutes to do and no executable instructions are changed by the programmer. The form is then keypunched and the deck of cards are compiled into the program. The PL/I preprocessor generates the new executable instructions.

Since we have to live with the W-2 print layout problem year after year, we tried to make the best out of it by programming around the problem.

Sam Becker
Senior Programmer
Foods Division
Tbe Coca-Cola Co.
Houston, Texas

IDS Oversight

In the recent Special Report on data base management systems (DBMS) [CW, Sept. 24], it was stated that the report was a mix of "tutorial" material and user experience.

The introduction to the report said "several packages are generally regarded as the major DBMS offerings: IMS, Total, IDMS, System 2000 and Adabas" and "Burroughs, DEC, Univac and Xerox all offer DBMS."

Nowhere in the entire 16-page report could we find any reference to Honeywell's product, the Integrated Data Store (IDS), beyond the oblique reference to it in the review of Ian Palmer's latest reference work that "General Electric (now Honeywell) released software of this type as early as 1965."

And, in spite of the fact that the British National Computer Centre survey of the DBMS users in the U.S. reported the reactions of several IDS users, your reviewer did not mention IDS at all while mentioning at least five other DBMS products.

Certainly the fact that IDS has today more than 450 users around the world at least qualifies Honeywell to be listed as a vendor which offers a DBMS, although we must candidly confess we cannot understand why CW did not categorize IDS as a "major DBMS offering."

May we respectfully ask whether the omission of any reference to IDS was simply an oversight?

Floyd E. Johnson
Manager
Database Product
Requirements Planning
Honeywell Information Systems
Phoenix, Ariz.

The omission of IDS was an oversight. IDS will be covered, however, on our ongoing "Data Basics" page in the Software & Services section. Ed.

Move Not 'Smooth'

I am writing in reference to the erticle about the John M. Smythe Co.'s conversion to Cincom Systems' Total [CW, Sept. 24].

The fact that DP manager Joseph Stacey did not have major problems can probably be attributed to two things – he knows his job and he used the Cincom package and not IBM.

To say, however, that the installation was "smooth" was somewhat contradictory, since on two pages later was a headline revealing it took 14 long months to do the job!

I am not being critical of Stacey, as I'm sure he did well with what he had. However, I hope top management did not see that issue of *Computerworld*.

In that same issue, the results of a DBMS survey were published. One user was quoted as saying, "It takes twice as long with people of a higher skill level to bring up an MIS system than a Burroughs'."

This means that if it took Stacey 14 months to bring up his system, it probably would only have taken seven months with Burroughs DMS II.

How much was seven months of nonproductive overhead worth to John M. Smythe Co.?

Lou Hernandez
Los Angeles, Calif.

Unfortunately, reader Hernandez missed several points. Smythe uses Cincom Systems' Total and not IBM's IMS, the specific DMBS the user in the survey article compared to Burroughs' DMS. We have no data on how a Total implementation compares with a Burroughs-based effort in time or skill required.

In any case, Stacey and his small staff were not dedicated to Total for 14 months. As the article noted, they continued development and maintenance of nondata-base applications in addition to bringing up Total. — Ed.

Identifying Grosch

In the Sept. 24 issue, Jerry L. Poppenheimer asked the rhetorical question "Who's Herb Grosch?" One answer may be found in William Rodgers' excellent book, *Think*, wherein he discusses Grosch as follows:

"Besides being a scientist and joining the early colony of IBM men with doctorates, he was the first and only person with a beard hired by the company in Watson's lifetime. To compound matters, achieving more distinction than a man ordinarily pursues, Grosch went into the intellectual circle of IBM scientists twice: first under the reign of old Tom Watson, and second in response to a directive from his heir, Tom Jr. — and was fired both times."

To save potential future embarrassments, Poppenheimer may want to read the entirety of Rodgers' book, which not only gives a history of one of the larger computer manufacturers, but the historical roles played by men with names such as Watson, Aiken, Eckert, Von Neuman, etc.

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Vice-President
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EDP/PR Survey Finds

CPE Concerns 'Fair Percentage' of Top Management

By Don Leavitt
Of the CW Staff

PHOENIX – A "fair percentage" of top DP management is concerned about computer performance evaluation (CPE), at least to the extent of receiving some reports regularly, according to a recently completed survey.

More than half of 206 users told *EDP Performance Review* (EDP/PR) hours of operations, user billings, CPU percent utilization and downtime are among the measures reported to their top DP executives. Beyond that, on the average, about one-third of the DP managers' managers are also receiving some form of performance reports.

In his summary of the survey results in the current issue of EDP/PR, editor Phillip C. Howard noted tools and techniques for measurement "exist, but need improvement. Manufacturers need to add certain types of measures to their accounting data.

"Vendors of [hardware and software] monitors and accounting packages need to concentrate on further reducing their outputs into more understandable and meaningful forms," he went on.

Finally, "suppliers and users alike can best serve management by searching for new and better ways to express theoretical systems capacity, to track usage against capacity and to enable the prediction of future systems resources," he concluded.

The 206 responses came from "about 4,000 questionnaires" originally distributed, and Howard was disappointed with the low level of reaction. The results "represent, at best, generalizations of real world activity," he thought, and may not be statistically defensible.

In total, 358 systems were covered by the responses. The number of multiple-system sites combined with the preponderance of larger systems was no surprise to Howard. Though CPE efforts can be useful in smaller shops, he conceded "many of the activities . . . are not economically justifiable."

It was also no surprise to Howard that job accounting data ranked as the primary measurement tool, with 93% of the users reporting some use of such data.

Software monitors are used by 51% of the sites reporting, which Howard said represented a "slight gain" over the percentage that used such tools when EDP/PR summarized another CPE survey in March of 1974.

The number of shops running CPE activities has grown in the year and a half since the 1974 survey, so the growth is actually greater than the 5% shown statistically.

Hardware monitors are used by 32% of the respondents in the current poll. Although this is a 7% decline from the March 1974 figures, Howard noted the actual number of monitors has in fact grown in that time span.

Extensive Questionnaire

Howard's survey vehicle was an extensive questionnaire covering everything from configuration data and tools and techniques used to the types of output – if any – presented to different levels of management.

To keep responses pertinent, he devoted a full page to 32 specific measures of performance under six general categories. Respondents were asked which measures they used, what the source of the data was, at what frequency the data was reported and to what levels of management.

The final section of the survey form asked questions designed to elicit specific information on the limitations of current measurement capabilities.

Requests for subscriptions for EDP/PR ($36/year) and copies of the October issue, in which the survey is covered, should be addressed to Applied Computer Research, Suite 298, 8808 North Central Ave., 85020.

Itel Devises Way to Put Vsam on 360s

SAN FRANCISCO – Users of IBM 360s are gaining more system capabilities supposedly meant only for 370 sites. Now, taking a page from one of IBM's most respected publications, Itel Corp. has devised the means of using Virtual Storage Access Method (Vsam) files on almost any 360 with 512K or more memory.

That such "downward compatibility" was possible was suggested last year by D.G. Kecher and J.O. Lacy, who wrote in the *IBM Systems Journal* that "although Vsam has been designed for use with virtual storage operating systems, it may also be used with all of the OS/370 [sic] operating systems."

The specific keys to use of Vsam under OS/MVT Release 21.8 on 360s lay in Itel's previously developed 3330-type disk support on 360 channels and the company's coding to simulate 370 instructions on the earlier machines.

By adding a paging mechanism called Virtual Linkage Subsystem (VLS), Itel now is able to use IBM's own Vsam logic – unmodified – on the 360s. That approach is important, Itel stressed, since it assures continued use of the high-powered access method on the 360s, regardless of how IBM may change its coding.

There are at least five basic reasons for 360 shops to consider using Vsam, according to Itel. Vsam already includes functional enhancements over old access methods, and these will certainly be extended. Overall, Vsam provides improved performance, Itel added.

With Vsam on a 360, the user has VS compatibility, and therefore backup, without necessarily having two 370s. Important to the DP staff, in Itel's view, are the thoughts that it will avoid technical obsolescense and have easier conversions whenever it finally does go to a 370 VS environment.

An extension of OS/360, VLS facilitates the execution of large programs in a small real memory area. Under VS, Vsam catalog management and Open/Close/End of Volume routines would require 240K on virtual storage; under VLS, they use only 20K of real memory, Itel claimed.

OS/Vsam is currently running at Itel's Palo Alto facilities and is scheduled to go into Beta testing at a user site still to be selected in January. General availability for users with at least some hardware from Itel at a price still to be determined is expected late in the first quarter of 1976.

Although 2314 and 3340 disk systems are supported under Itel's 370-on-360 capabilities, users must have at least one of Itel's 7330 disk drives for VLS, a spokesman noted from One Embarcadero Center.

Tymshare Offers 'Magnum' for Relational DBMS

CUPERTINO, Calif. – The Magnum information management system now available on Tymshare, Inc.'s remote-computing network is built on "relational" concepts which the vendor believes will be the basis of "an entire new generation of data base management systems [DBMS] and services."

The relational approach to DBMS design has been the subject of much research and experimentation in recent years. When properly implemented, it gives the user a dynamic view of data with relationships defined "on the fly" rather than before application programs are written.

It isn't necessary for the relational DBMS user with Magnum, for example, to know or care how the computer – in this case, a Digital Equipment Corp. Decsystem-10 – executes instructions to access or change items in the data base.

Working with simple two-dimensional tables showing how a pair of items are related, the user can create any relationships required with a set of eight Magnum commands, Tymshare said.

The user overlays, in effect, the simple tables so the common item type in each drops out and the previously undefined relationship between the remaining types becomes obvious.

The specification of the mechanism to bridge the gap between data and the user's requirements is stored outside the user's programs (and outside the data base, in that no "pointer" records are used) in the data base description. System software applies these specifications when compiling user data accesses.

With an approach such as that used in Magnum, savings in maintenance work – on both data base revisions and reprogramming – are "significant," according to the vendor. Tyipcally, half of an installation's time and resources is spent in maintaining a conventional DBMS, a spokesman estimated; with Magnum, the level of effort drops to 15%, he said.

Magnum also cuts sharply into the time and effort needed to get a data base designed and operational, he added.

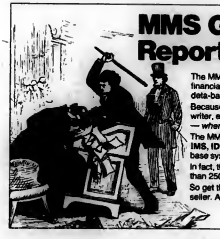
Since Magnum has been implemented on the Tymnet network, users have gained the data communications facilities that are often desirable, without the headaches of maintaining lines and equipment, the spokesman added from 20705 Valley Green Drive, 95014.

Correction

The Terminal Application Processing System (Taps) [CW, Sept. 10], was developed and is maintained by Decision Strategy Corp., 2 W. 45th St., New York, N.Y. 10036.

Distributor of the package in New York, New Jersey and Connecticut is American Computer Software Clearinghouse, Inc., 440 Park Ave. South, New York, N.Y. 10016.

Distributor of Taps beyond that three-state area is International Systems, Inc., 150 Allendale Road, King of Prussia, Pa. 19406.



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'Abanal' Controls Abend Dumps

BEDFORD, Ohio – The Abend Analyzer (Abanal) now marketed by Operating Systems Services, Inc. (Ossi) was designed to eliminate most IBM 360/370 OS abnormal termination dumps and to assist in solving the problems that cause them.

Developed by Tomark, Inc. of Seven Hills, Ohio, Abanal is said to diagnose more than 160 unique Abend situations. These include program data exceptions, data checks and "almost all" current access method (including Vsam) file problems, according to Ossi.

No modification in OS/MFT, MVT, VS1 or VS2 environments are required – except for two minor JCL changes – and changes between these systems can be made without changes to the user's application programs.

When a call to the IBM Abend routines is intercepted, Abanal loads and deletes routines to diagnose the problem. The Data Management Control Blocks for all Open files are formatted and printed as an additional aid, Ossi noted.

The System Completion Code is compared against the installation-defined Dump/No Dump table to determine if a dump has been requested for the situation that has been encountered.

Programs not using Abanal's dynamic load feature or the optional Call statement merely follow IBM's routines if an Abend occurs, the marketer said.

Beyond the formatting of control blocks and support for variable Dump/No Dump tables, Abanal includes a dynamic "Compile, Link and Go procedure for testing under Abanal and elimination of 'silly' Abends such as 'Program Not Found, Out of Core and Missing DD cards,' " it added.

Written in Assembler, Abanal uses about 750 bytes for its interface routine and linkage. An additional 2,500 bytes are dynamically used and then returned to the system before the IBM termination routines are brought in.

The package is available for $5,700 or $158/mo from Ossi at 210 Best St., 44146.

Users Have Choice Of 'IQ' Packages

WALTHAM, Mass. – Users of Honeywell 6000 or IBM 360 and 370 systems may now be able to choose just how much report-writing support they want by utilizing any of three versions of the Information Quick (IQ) package from The Management Group, Inc. (TMG).

All three versions are said to include "extensive" default values, which allows nonprogrammers to learn the system easily. Headings and column locations, for example, are managed by the system, although advanced users may override these and other defaults.

Either detail or summary reports can be generated by all versions, and all have the ability to define and redefine fields and to handle multiple-record types and hierarchies, TMG said.

All three versions operate in load-and-go mode, the vendor added.

"Unlimited" calculation and selection capability is available, including the ability to PERFORM a series of predefined steps based on selection criteria test results. A file/record definition dictionary is also included in all IQ systems.

High-IQ, the most powerful of the line, supports matrix reporting, table lookup operations, multifile input and output.

Both High-IQ and Average-IQ, the next in the series, can be interfaced with a specific data base application "relatively simply," the spokesman added. In general, however, Average-IQ is less powerful, not having matrix-reporting, table lookup or Occurs clause capabilities.

Average-IQ and Low-IQ are upward-compatible with the top of the line but again, Low-IQ is less powerful than the others.

IQ is written in ANS Cobol and runs in 55K. The package costs are in relation to their capabilities, with High-IQ at $15,000, Average-IQ at $12,000 and Low-IQ at $9,000.

TMG is at 393 Totten Pond Road, 02154.

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APL Net Backs Users of 5100

BETHESDA, Md. – A library of application programs on the APL-Plus remote-computing service offered by Scientific Time Sharing Corp. (STSC) is being made available to users of the IBM 5100 portable computer, according to an STSC spokesman.

The programs and APL-based utility routines will be accessible to a 5100 used as a terminal linked to APL-Plus or as packages for use on a 5100 in stand-alone mode.

Initial offerings, the spokesman said, include financial analysis library, a plotting package and a programming "tool kit."

Although the recently announced 5100 supports either APL or Basic, there are features in its design that indicate its prime role is as an APL unit; in that role, it seems better than anything comparable in price on the market now, the spokesman said.

By trying some of the programs while using the 5100 as a terminal linked to APL-Plus, a user inexperienced in APL can gain a knowledge of the language and turn to STSC technical personnel for support before bringing the program in-house for a stand-alone operation, the vendor suggested.

Support, including the APL seminars STSC runs periodically in various cities, will continue to be available to the user who does move the software onto his own in-house 5100, the spokesman added.

Use of the APL-Plus facilities while the 5100 is linked to the service will carry the company's normal rates for time and resources.

APL-Plus is accessible from 80 metropolitan areas across the country. The vendor is based at 7316 Wisconsin Ave., 20014.

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GRAHAM

On-Line Access System Keeps This Firm 'On the Ball'

OAKLAND, Calif. – Ball Computer Products has installed a minicomputer-based on-line system to control manufacturing operations at its main office and plant here.

Developed by HMS Limited, an Oakland software firm, the system is used for inventory control, material requirements planning and purchase orders.

All data is entered on-line via CRT terminals from source documents. These terminals are also used to retrieve up-to-date information on stock items, bills of materials, vendors and purchase orders.

A unique aspect of the installation is its implementation; HMS wrote the system in Data Access System Language (Dasl), a high-level approach it created specifically for coding such on-line, transaction-oriented turnkey systems.

Ball Computer Products was faced with an expanding product line requiring complex bills of materials. The product line, including minicomputer systems, peripheral subsystems and OCR equipment, is made up of over 5,000 distinct parts, all of which must be maintained in inventory. Manufacturing some items requires from six to eight levels of subassemblies.

Ball did not have timely information of stock levels and was unable to reserve stock for scheduled future production. The frequent changes in bills of materials resulted in extensive paperwork to adjust stock requirements and order components with sufficient lead time to meet production schedules.

Search for Solutions

Jim Hunter, Ball's operations manager, began a search of available solutions, including service bureaus and in-house equipment.

"We specified an on-line system with data capture right at the source," he said. "That was the only way we could have accurate stock status information at the instant we needed it. The HMS system offered the most power for system cost.

"Its use of Dasl meant we could have a flexible system customized to our requirements without waiting. The inventory control portion was up and running in four weeks. Bill of materials, purchase orders and reservations were developed with similar speed," he said.

HMS saw the need for generalized language for writing transaction-oriented systems after developing a data entry and validation system to control stock inventory at the Pacific Stock Exchange's Pacific Securities Depository.

"Many of the techniques we developed for the exchange system are generally applicable to all manner of business and manufacturing situations," Philip Henningsen, vice-president at HMS, explained.

"At the same time, he noted, each company has numerous unique aspects in the way it handles its business, so a canned program is not always particularly useful

"With Dasl, we have a formal language structure and some 200 interrelated, precoded routines that can be knit together to do productive business-oriented data processing. The user obtains the benefit of a custom turnkey system without the cost."

Dasl creates systems in which all data bases are on-line, capable of immediate inquiry and update. Data is entered via a CRT from source documents. Extensive validation displays errors immediately to the operator for correction prior to posting.

CRT operations are in "page" mode. The operator keys in the function to be performed and the appropriate page format appears on the screen. Batch control of entries is also provided.

There is no limit to the number of functions available. Separate functions can proceed concurrently at different CRT terminals, or the same function can be in use independently at several terminals.

Ball uses about 30 functions, or transaction types. For inventory control, transactions include issuing items from stock, entering items to stock, adding and deleting part numbers, inquiring on part number status, producing partial or complete inventory listings, extracting histories of past transactions and producing an order review list of items which have reached the minimum stock level.

The bill-of-materials subsystem performs transactions on a complete bill of materials rather than just one part – inquiring on the availability of parts for 10 OCR machines, for example, or producing a picking list combined for more than one level for a bill of materials with cost information.

The system will also issue a quantity of all items listed on a bill of materials, add new bills or new items to a present bill of materials and allow a part number or other information in the bill to be changed.

The purchase order subsystem allows entering a new order, display of previously entered orders, a report of orders with dollar value and reports on open and overdue orders. Lead time information on file is used to report which items should be ordered to meet production schedules and maintain minimum stock levels.

The reservations subsystem is used mainly to allow time-phased purchasing against a production schedule.

HMS has implemented the system on a Ball Computer Products minicomputer with 32K words of core, a 2.9M-character cartridge disk drive, magnetic tape drive, three CRTs and a 120 char./sec printer.

Ball expects that it will be able to expand its system, incorporating such applications as sales analysis, accounts payable, accounts receivable and general ledger, with a minimum of effort.

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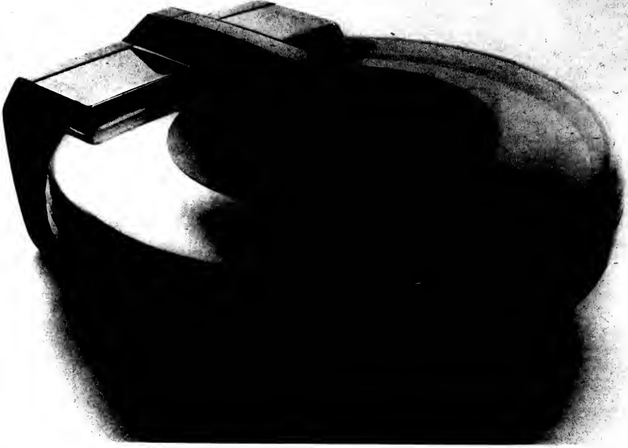

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For Either 360s, 370s

Package Lets Users Attach IBM 3705 to Dual Hosts

By Ronald A. Frank
Of the CW Staff

MANHATTAN BEACH, Calif. – Users can attach a single IBM 3705 front end to two 360 or 370 CPUs by combining IBM hardware with software from Comm-Pro Associates.

The IBM hardware changes are included as a request for price quotation (RPQ), or nonstandard, offering that is only available without the software to make it work. The RPQ allows the user to operate two channel adapters on the same 3705.

In order to implement the hardware capability, the user must have a second storage frame, a second Type I channel adapter and a second attachment base, according to IBM.

Once the necessary hardware has been acquired from IBM, the user can get the Multi-Host Support (MHS) package from Comm-Pro. The package requires approximately 2,000 bytes of 3705 storage and contains line-switching logic that allows incoming lines to communicate with either of the two host CPUs.

In the event of a host failure, lines can automatically be rerouted to the host which is still operational.

During off-hours, the teleprocessing load can run on one host without the need for mechanical line or channel switches, the company said. This reportedly eliminates a teleprocessing monitor which can require up to a half-million bytes of real core.

No hardware or software changes are required in the dual hosts and "only minor changes" are required in the 3705 Emulator Program, according to Comm-Pro.

The MHS software is available in three versions of a lease-only basis. The PP01 package includes manual switching of lines and costs $200/mo; the PP03 package adds code conversion for IBM 2740 and 2741 terminals and costs $230/mo; and the PP04 package includes user-initiated switching of CPUs from remote terminals.

With the latter capability, the terminal operator calls out the desired software system and the terminal is then connected to the proper CPU subchannel. This package, which costs $450/mo, also allows 3705-generated messages to be sent back to the terminal if all subchannels are in use or one of the CPUs is down.

The MHS software is available on a 30-day trial basis and Comm-Pro will provide continuing support "in the event IBM software changes affect the operation of the package." The firm is at 638 14th St., Suite 700, 90266.

The IBM RPQ costs $249 on monthly rental, $212/mo on the 24-month Extended Term Plan or $9,792 purchase. The RPQ number is EF 6241 and further information is available from local IBM branches.

'Grasp VS' Backs 3741 Terminals

SAN MATEO, Calif. – Software Design, Inc. (SDI), has expanded Grasp VS with teleprocessing support for the IBM 3741 terminal.

Grasp VS will support the 3741 in either of two modes, data communications or full remote job entry (RJE).

Using the data communications mode, the company said, users can transmit data to and from a remote location with the full computer setup and job control responsibilities remaining in-house at the DP site.

On the other hand, full RJE mode is also available for users who want to use the 3741 for applications such as program development, which requires more control at the remote terminal.

The diskette terminal may be hooked up to the central computer either by dial-up or by private lines, SDI said. Grasp VS supports either type of connection with "virtually no operating differences."

Additional user programming is reportedly not required. Once a program is working with a normal card reader and printer, it will work unaltered with the diskette terminal, SDI said.

This means existing in-house systems can be transferred to remote operation without programming changes and new systems can be completely developed, tested and debugged in-house, a spokesman explained.

Transmission to and from the 3741 includes both data compression and record spanning as standard features. The result is said to be maximum throughout and minimum line costs.

The software is available now and costs $24/mo for the remote terminal capability plus $24/mo per CPU port. The firm's address is Box 5854, 94402.

EFTS Seen Creating Retailing-Banking Competition

NEW ORLEANS – With electronic networks and terminals that provide many self-service banking features appearing in both retail and banking locations, the two industries are likely to become competitors for providing customer services, according to William S. Anderson.

Anderson, chairman and president of NCR Corp., made the remarks at the 17th annual EDP and Data Communications Conference of the National Retail Merchants Association (NRMA) recently.

As keynote speaker at the four-day conference, Anderson told the retailers that, with the advent of electronic funds transfer systems (EFTS), banks now realize the retailer's customers "can also become their customers.

"And," he added, "it can also work the other way."

Integrating store operations with EFTS of the future raises many questions for the retailer, Anderson said. These include the impact on the retailer's credit business, costs of debit-card transactions and sharing in the benefits of electronic funds transfer.

Anderson strongly endorsed the OCR-A voluntary retail identification standard adopted by the NRMA for use in marking merchandise tags and other control documents. OCR-A can be read by scanning devices and, according to Anderson, will contribute to a more efficient retail industry because it makes possible the automatic and accurate capture of key data.

"Most important of all," Anderson said, "for consumers OCR-A can mean new levels of convenience, time savings and improved accuracy – all of which can make shopping the enjoyable experience it should be."

He said NCR would continue to provide and support equipment using the color bar code and other proven identification systems now in use, "even though our future development efforts will be devoted to OCR-A now that it has become the industry's voluntary standard."

In commenting on general merchandise retailing's OCR-A standard and the Universal Product Code (UPC) developed by the food distribution industry, Anderson said OCR-A should be judged on its own basic merits rather than on its compatibility or lack of compatibility with UPC.

He warned retailers to be prepared to deal with "increasing government overregulation and encroachment" as the electronic retail systems of the future evolve.

Restrictive price-marking legislation has been introduced in Congress, in many state legislatures and numerous cities, he noted, even before supermarkets have fully tested the new UPC scanning systems and "before the shopping public has had an opportunity to decide whether it likes them."

Synchronous Modem Allows Use of Asynchronous Devices

FORT WASHINGTON, Pa. – The Tele-Dynamics Division of Ambac Industries has added a feature to its 2,400- and 4,800 bit/sec modems that enables asynchronous terminals to be used on a synchronous line.

The asynchronous-to-synchronous interface will allow users with asynchronous terminals or minicomputers with asynchronous data ports to run their equipment on synchronous lines, thus taking advantage of higher transmission speeds, a spokesman said.

When high-speed asynchronous terminals such as CRT terminals are used with synchronous modems, there is the risk of losing data when their speeds are not identical. The asynchronous-to-synchronous interface buffer option on medium- and high-speed modems will correct for this situation by converting the terminal's serial data stream to parallel words and storing the data in a 48-bit memory buffer, a spokesman said.

The output section of the buffer then accesses the memory and shifts the words out serially under control of the modem clock signal, he added.

Should the modem run faster than the terminal, the buffer inserts extra stop bits into the data stream to compensate for the difference in total bit throughput. If the terminal runs faster than the synchronous data stream, the buffer's memory will handle a packed block transmission of 200,000 bits (20,000 characters).

The two modems equipped with the interface are the 7201, which is Bell 201-compatible and costs $1,100, and the 7208, which is Bell 208-compatible and costs $3,500.

The interface feature can be added to some modems already installed and the capability by itself costs $200, the spokesman said.

Tele-Dynamics is at 525 Virginia Drive, 19034.

The new 30 cps Terminal from AJ

Here's the *brand new* AJ 830, a 30 cps impact printer terminal that utilizes AJ's microprocessor control and the innovative "daisy" print wheel. The AJ 830 is ideal for interactive time sharing, information entry and retrieval, and point-to-point data exchange.

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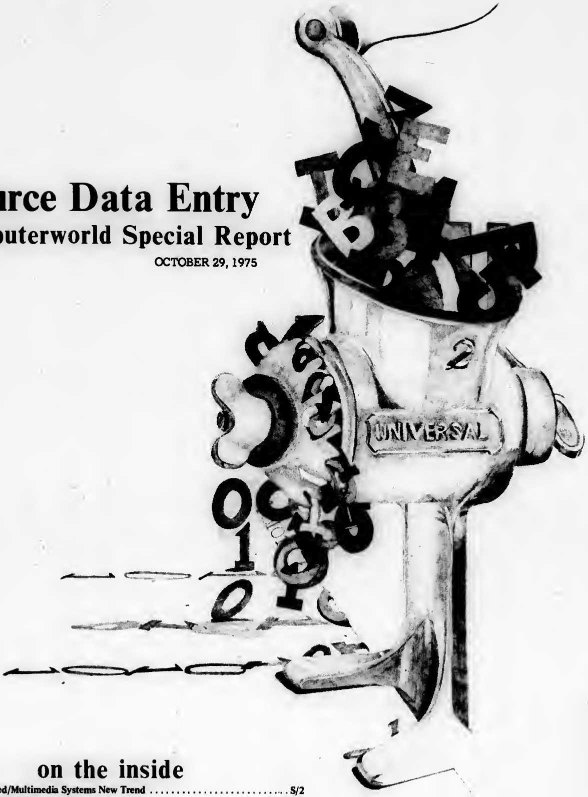
A Computerworld Special Report

OCTOBER 29, 1975



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This special report was prepared under the direction of Victor J. Farmer. Cover art was done by Cynthia L. Kintzer.

Inputting on Mixed/Multimedia Systems New Trend

By Jan Snyders
Special to Computerworld

Data entry equipment has taken on such a wide area of application today one needs a score card to tell which can do what.

It encompasses areas such as optical character recognition (OCR), mark sense, Micr, point of sale, industrial and multipurpose data collection, financial information systems, multimedia systems and key-to-storage.

Of these, key-to-storage is the most widely discussed for everyday applications. But even in this area we are witnessing a new trend.

According to the latest *Auerbach Reports*, there are more and more "multimedia" systems appearing on the scene. Basically, these systems started out consisting of a marriage of key-to-storage with OCR. Later, systems were designed to handle Touch-Tone data entry and word processing by mixing various types of equipment with key-to-storage.

The idea of multimedia systems seemed rather dormant until July of this year when IBM made one of its "major" announcements. This was the announcement of the 3760 dual key-entry station at the same time it announced the 3790 communication system/data entry configuration.

What this indicated, at first appearance, was that IBM enhanced its communication system. Other indications were that it is IBM's entrance into the shared-processor key-to-disk market.

Auerbach feels it is the marriage of key-entry systems with the controller. It is the controller that provides the disk storage, as opposed to the usual separate disk units per system.

Whether the system can be considered competition with the old established key-entry systems on the market is debatable. Considering it requires attachment to a virtual storage IBM System/370 computer certainly places this system in a class of its own.

However, the same idea of uniqueness applies to any mixed/multimedia system. About 1-1/2 years ago there were only three of these systems on the market. Today there are seven. Strangely enough, all of these systems are unique, and all were developed under a different guise.

For instance, Recognition Equipment, Inc. (REI) manufactures a system called Input 80. To this system, REI incorporated an optional feature called Total Data Entry which allows users of rather high-volume OCR page readers to gain the additional key-entry capability. In other words, the key entry function is pretty much an adjunct to the OCR feature.

Another of the original trio is Scan-Data Corp. with its 2250. This system was developed to handle both OCR-readable and non-OCR-readable data. The Scan-Data system consists of an OCR reader for scanning OCR-readable data, a CRT-type keystation for handling OCR rejects and a non-CRT keystation for entering non-OCR-readable data.

Software available allows key entry of certain data from a document, and then OCR scanning of certain data from the same document, with all data from the same document merged on the output tape. Reentry of OCR rejects can be done with little or no impact on the scanning throughput.

A different system is available from Cummins-Allison. With its background in mark-sensing equipment for turnaround documents (Scanak), the company designed the 4400 to handle turnaround documents. The system consists of a document and ticket scanner and a number of CRT-type keystations for entering data from documents that can not be accepted by the scanner; it also handles scanner rejects.

The only similarity between these systems is it all started out with OCR and then added key-to-storage to create the multimedia system.

However, early this year, Entrex, manufacturer of the 480 key-to-storage system, came out with enhancements to it. They took a different route and added OCR reading to their established key-entry system. The Entrex 480/720 system is designed to perform data entry off-line from the main computer systems.

The 480 consists of up to 32 keystations, a minicomputer, magnetic disk, magnetic tape, a complete data entry software package and various options including communications capabilities.

The Model 720 OCR reader can be added at any time with no interruption of work flow. With the addition of the scanning capability, data from machine-printed documents is automatically captured and processed concurrently with keyboard entry from any of the 32 keystations.

The latest entrant into the mixed-media area is Control Data Corp. This September CDC entered the key-to-disk field with what it called a distributed data entry system. Titled the Cyberdata, the system, which can handle up to 63 local or remote keystations, is designed to allow large users to replace five or six separate key-to-disk systems with two of the Cyberdata systems.

The company claimed that in March it will adapt the units to concurrently drive OCR equipment in the background area while data entry continues in the foreground. Thus, it will be multimedia.

At the time of this writing, Cyberdata systems can handle OCR separately, permitting a user to do key entry during the day and then use the system's processor to run an OCR device at night.

At the time Auerbach initiated the inclusion of mixed-medis systems in its input/output reports, the following statement was made: "Our stress on the multimedia system will relate to the integration of an optical reader and a keyboard-to-disk system into a single data entry system so there is on-line interaction between both systems, with software to operate both systems simultaneously."

Basically, it was referring to OCR and key-to-disk. Although this is still our feeling, there are other forms of multimedia systems.

One system in particular is the General Computer Systems (GCS) System 2100 which is a shared-processor, multifunction, multimedia, source data entry system. It is designed for the large data processing user and can be considered as an input/output front-end section for a computer system.

As a multimedia system, it cannot be considered competition for Cummins-Allison, REI, Scan-Data or Entrex since these systems all consist of only key-to-storage with OCR/OMR configurations. It is also one of the very few offering up to 64 keystations in the system.

However, its basic difference stems from its various applications. For instance, Datatone, which the manufacturer claims is exclusive with the GCS 2100, features Touch-Tone data entry.

With the addition of the Datatone controller, all that is required is the Touch-Tone telephone.

Any or all data transmitted via Datatone entry may be keyed or entered through an optional card dialer.

After years of predicting the ultimate destiny of OCR in data entry and the transitory nature of key-to-storage, the data entry industry may have at last found the perfect combination.

From three multimedia systems to seven in 1-1/2 years may seem like slow progress. However, the introduction of the IBM and CDC systems may start the wheels of progress turning in other companies.

Snyders is project editor for Auerbach Computer Technology Reports.

Competition Growing

Data Entry, Communications Marts Becoming One

By Steve Thurston
Special to Computerworld

WALTHAM, Mass. – The line of distinction between data entry and data communications is becoming hazier with each new product announcement.

Traditional keypunch replacement products are incorporating data communications capability to take advantage of the growing market in remote data entry. Conversely, more and more data communications terminals are performing data entry functions.

As suppliers move to round out their product lines, two previously distinct markets are merging. Companies are now meeting head-on with others they never previously considered competitors. While greater competition is fostered, ample market opportunities also exist for all participants.

During 1974, an estimated 160,800 data entry/communications devices were shipped to the U.S. marketplace with a corresponding dollar value of $1.2 billion. By year-end 1974 the installed base of such equipment was 840,500 units at $5.3 billion. Growth rates of some 15% per year can be expected in the number of devices in use through 1979, bringing the total number in use to an estimated 1.6 million devices representing $12.7 billion.

Segmenting Market

There are several distinguishing characteristics which are meaningful in segmenting the general-purpose data entry/communications marketplace.

One of the most basic is whether the device uses a keyboard as its prime means of input.

Another is its programmability – can the device be programmed by the user?

And the third primary characteristic is whether it possesses communications capability. Building on that general framework, a prognostication for the various equipment categories can be formulated.

The future of the keypunch market is rather bleak. While use of the 80-column unbuffered versions is steadily declining, buffered versions are still experiencing some healthy shipment activity.

It is the 96-column market that holds the key, as it were, to the overall market. Its future is directly linked to the Sys tem/3 which nears the end of its product cycle.

In addition, the 3740 data entry system is making a grave impact on this base, replacing 96-column devices.

Combining the effect of these two factors leads International Data Corp. (IDC) to predict a peak in the installed base of 96-column keypunches by year end.

Key-to-tape devices continue their steady decline in usage.

As for the IBM 3740 data entry system, the IBM 3741-1 and 3742 (dual-station versions) represent the bulk of stations installed today, but the mix is rapidly changing, reflecting user desires for the other models possessing programmability and communications capability.

The IBM 3741-2, with communications,

(Continued on Page S/4)

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Large Service Bureau Finds

OCR Puts Accuracy, Reliability, Costs in Users' Hands

By Delmar W. Smith
Special to Computerworld

ST. LOUIS – McDonnell Douglas Automation Co. (McAuto), which provides DP services for businesses throughout the U.S. as well as for all divisional companies of McDonnell Douglas Corp., is keenly aware of the staggering costs of data entry.

For example, keypunching alone accounts for a full 25% of our total cost of processing a 70,000-name corporate payroll.

To lower our costs while maintaining the flexibility to support the wide range of DP applications encountered every day, we use all the well-known types of data entry equipment, including on-line, key-to-disk, buffered keypunch, the IBM 029 keypunch and optical character recognition (OCR).

Of these techniques, OCR is of special interest to McAuto because it allows data entry responsibility to be placed in the handa of the user, who usually is better able to control the accuracy, reliability and costs than a large central data entry shop.

We recently replaced three Control Data Corp. 915 page readers with Scan-Data Corp. page/document readers at our Long Beach [Calif.] and St. Louis data centers, mainly because we were running out of available reader time, but also because we foresaw a requirement for reading the several different typefaces provided by the new equipment.

The reader in St. Louis is utilized over 250 hour/mo, more than double the utilization rate of the Long Beach reader. The reason for the big difference in utilization is that in St. Louis we are reading, in addition to departmental OCR typing, the daily output of 140 typists in a facility completely devoted to OCR typing.

Compared Costs

Having this special OCR typing facility in a city near one of our keypunch facilities of similar size and capacity allowed us to directly compare the cost of keypunching with OCR typing and scanning.

The results revealed OCR costs 7-1/2% less per hour for labor and equipment than keypunching. In addition, a very real cost savings was found in OCR typing because of increased productivity through a reduction in keystrokes.

Generally, we experience from 1,000 to 2,000 stroke/hour greater throughput by typing. But the really big cost savings are found in eliminating keystrokes.

For instance, just a few weeks ago we reevaluated an existing keypunch job we thought was very competitive. It was designed for partial freeform. By using the computer to generate several characters, we saved several keystrokes per card.

But after examining the possibility of using typing instead of keypunching, we found we could save another 10 strokes per card image. Since this was a six-million-card conversion, the savings totaled nearly 12,000 hours of work.

I saw another example of this kind of savings recently when we were asked to bid on a two-million-record conversion. The competition, which was an in-house operation using on-line equipment with part-time labor, was formidable, to say the least.

Our first "cut" at this job was a disaster. We were way over the client's in-house costs because we were trying to emulate his approach to the job. But after performing another analysis of the application, using OCR typing as the input, we found the scanner could generate 375,000 records automatically with very little effort on our part.

It is true the client could have done the same thing with his computer, but it would have meant an extensive and costly reprogramming effort which he was not willing to expend.

Stroke Savings

Some of the more obvious stroke savings through OCR are realized by eliminating zero-filling of amount fields. If you have an eight-position field requirement with an average usage of four significant digits, you can save four strokes per field by eliminating the zeros and allowing the OCR scanner software to right-justify and zero-fill the field.

The negative factor in OCR typing is that a keystroke is required for each field separator used. But this disadvantage is far outweighed by positive factors such as the error-correction techniques used by the typist.

Erroneously typed charscters, fields and whole lines are deleted by using special characters on the typing font as defined to the scanner software.

A typist or a keypunch operator usually knows by "feel" when he makes a finger error. An OCR typist can look at the character and take positive action immediately, but a keypunch operator must wait and try to interpret what was punched.

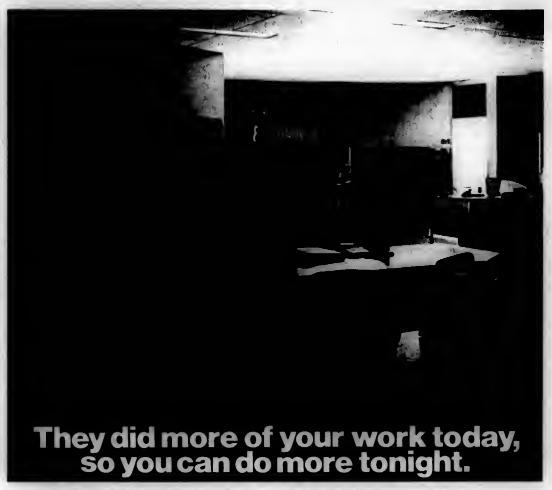
The keypunch operator must skip out the error card and duplicate over to the error, then make a correction. An OCR typist, however, can make corrections immediately with no problems.

Our studies showed it takes nearly five clerks preparing keypunch worksheets to keep one keypunch/key verifier busy. These clerks are doing nothing more than copying source information into a card format.

It is just as easy for them to type the data in the first place and eliminate the requirement at central keypunch. We have done this in our St. Louis and Long Beach facilities by placing more than 100 OCR typewriters in operating departments.

Only minimal training is required to teach clerks how to type a given application. Usually one to two hours will be enough to get a typist started. We have found most users of DP would much rather be responsible for the integrity of their own data files than have central keypunch involved.

Smith is section manager of data entry services at McAuto.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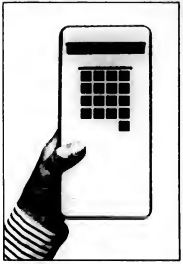

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With Push-Button Phones

Simply 'Let Your Fingers Do the Keying'

By Rick Moss

Special to Computerworld

Push-button telephones were used commercially for the first time in Carnegie-Greensburg, Pa., on Nov. 18, 1963.

Eleven years later, 20,221,000 of them had been installed, and new orders were averaging 2,500,000 a year.

But people aren't just talking on push-button telephones these days:

- A retail clerk takes a customer's credit card and, using a push-button telephone, keys the cash register code, the credit card number and total purchase amount. The computer on the other end checks a disk file for credit card status (stolen or otherwise invalid?) and credit limits.
- A catalog customer calls in his order on a push-button telephone. The computer's voice response unit indicates the item is in stock and the customer relays details of his order by keying numbers on his telephone. He can even request the order be left in his garage.
- A salesman for a wholesale distributor picks up the receiver of a push-button telephone in his client's office. After dialing his warehouse, he keys an authority code, customer number and code and quantities for the items ordered. Processing of the order begins immediately with a minimum of paperwork.

All these applications are done with ordinary push-button telephones that function the same way. Push-button telephones generate two tones whenever a button is pushed. The total of eight separate tones available for character generation are divided into two groups, A1 to A4 and B1 to B4.

Each number, 0 to 9, and the characters "*" and "#" are represented by two tones, one tone from each group. Both tones must exist for approximately 40 msec and be within ± 1% of the specified frequencies to generate a character.

Transmission rates of up to 20 char./sec are possible. Keying rates of three char./sec are common.

Repeat Characters

A few problems occurred when push-button telephones were first used as data entry devices. One problem was repeat characters. If a button was held down too long, the character was generated more than once. Modern demodulation devices have eliminated this problem.

Telephones have always been protected against errors caused by depressing more than one key at a time. Check this yourself. Listen to the sound of a number on a push-button telephone; while keeping that number depressed, depress a number beside it. The B tone is eliminated.

Let up on the second number and depress a number above or below the original button. The A tone is eliminated. Simultaneously depress any two keys on a diagonal and no tones are generated.

Standard push-button telephones use only 12 of the possible 16 combinations of A and B tones. Acoustically coupled telephone terminals use all 16 combinations. Alphanumeric terminals either transmit two numbers for each character or add a third group of tones, C tones, and transmit three tones simultaneously for each character.

Development of Push-Button Technology

Push-button technology was, of course, developed some years before it was applied to telephones. A card reader was for sale in 1960 that transmitted information from 80- or 51-column card with signals similar to A and B tones. Communication was achieved by a modem equipped with a standard dial telephone and handset.

The first telephone data entry systems connected push-button telephones or card reader terminals to card punches or teletypewriters. The user dialed a telephone number and waited for an answer.

After the answer tone was heard, he keyed and holes were punched in a card or paper tape. If the user realized he had made a mistake, extra steps were taken to make a correction.

With punched cards, he signaled the card punch operator to remove the erroneous card and then rekeyed the record. On paper tape systems, the user keyed a special code, then started over.

These electromechanical devices were subject to frequent maintenance and failure, but had a low initial price.

Meanwhile, expensive dedicated computer systems were also available for push-button data entry. They offered voice prompting for the user, file inquiry responses and other man-machine interface software. The disadvantages were price and customer-provided software.

Enhancements Added

In the last five years, though, at least a dozen companies have entered the telephone data entry market, building and selling equipment specifically designed to enhance and facilitate the basic push-button telephone.

On the user's end, there are acoustically coupled terminals that provide 256-character memories, light-emitting diode (LED) displays, alphanumeric keyboards, hard-copy output and other options. Central receiving systems are no longer electromechanical; they use the cheaper and better computers now available with turnkey software.

Telephone data entry itself is not unique, but a special application of the total concept of data entry. Two applications are particularly suited to telephone terminals: file inquiry and data collection.

File inquiry involves two-way communications between the user and the system. Voice responses are commonly associated with the application such as the bank computer that tells customers their current balances in response to account numbers. The clerk who checks out a customer's credit card is also using file inquiry.

Data collection allows companies a broader scope of operations. Data can be gathered easily and quickly from remote sites, using non-DP people. In fact, the telephone terminal's main competition is the U.S. Postal Service. A company has to choose between having its salespeople write or type all orders and:

- Mail them to Order Processing.
- Forward the paper to Data Entry.
- Forward the data to Data Processing.

Or its sales force could dial the computer and enter orders directly.

Push-button data entry has been available for more than 15 years. The technology is well advanced and the hardware is among the most reliable in DP equipment. And there are more than a dozen companies selling in the marketplace. Yet, in terms of product life, telephone terminals must be considered toddlers.

Even Ma Bell has acknowledged the potential use of her telephone instruments and lines for data entry. Push-button phones now come equipped with circuits that disable the tone generators as soon as the telephone number is dialed.

It is foreseeable that charges may soon depend on voice or data transmission usage.

The question is: Will industry make use of all that is available to it?

Moss is a product manager at General Computer Systems, Inc.

Line Between Communications, Data Entry Marts Grows Hazy

(Continued from Page S/2)

is growing rapidly in usage, primarily with System/3s.

And the 3741-3, programmable but without communications capability, is not expected to be a major factor in the growing use of the 3740 data entry system.

The Model 4, essentially an intelligent terminal, will experience healthy growth.

Conversational terminals, in general, are a declining market.

The great majority of them are printer-based like the ubiquitous Teletype and the IBM 2740/41. Their population will gradually decline.

CRT versions are not as plentiful, yet may be expected to grow at a moderate 10% rate per year.

Editing terminals are expected to exhibit strong growth. The printer-based terminals which incorporate a buffer have existed only to a limited extent, but should be bolstered by IBM's 3767 and 3770 family of terminals.

The CRT versions (with line/character insert/delete capability) are comprised primarily of IBM 2260/3270s and compatible replacement versions. The Teleype Model 40 is included as an intelligent product marketed as a direct 3270 replacement which are included here as processing terminals.

Key-to-Disk Declining

Key-to-disk systems are a declining market measured by annual shipments. The installed base is expected to peak by year-end 1977 and some replacement activity is becoming noticeable.

This forecast does not spell doom for current manufacturers, however, as most of them are moving into the communications parts of the product segments, included here.

Stand-alone processing terminals (intelligent terminals), meanwhile, are expected to exhibit very healthy growth rates. The installed base at year-end 1979 is forecast to be over four times that of December '74.

Clustered processing systems, such as the IBM 3790, Four-Phase systems, Data 100 Keybatch, Computer Machinery Corp. 5780, while existing on a limited scale today, are expected to exhibit the greatest growth rates in the coming years as the trend to using intelligence to capture data at its source continues in the data entry/communications marketplace.

IBM's Blessing

In such a dynamic marketplace, IBM has played a comparatively minor role to date. Outside of its keypunch base, it has been independent suppliers who have been first to develop newer, more sophisticated devices.

A much stronger stance has been taken, however, in the last year or so.

New products, software and line protocol announcements suggest rather certainly that data entry/communications is very much in IBM's plans for users for the balance of the '70s.

With the final blessing of the Giant, distributed processing should provide for the bulk of the expected market growth in the next five years.

Thurston is account manager of corporate planning service for International Data Corp., a market research firm.

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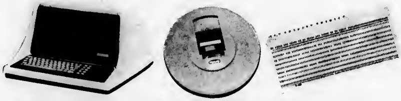

INPUT. CYBERDATA is CDC's unique modular data entry system that means you don't have to buy a new system every time you want added capability. To basic key entry, you add such modules as an OCR reader, a batch terminal, or additional remote key entry stations. CDC also offers MICR reader/sorter systems; batch terminals; multi-font OCR document and page readers; and OCR page readers that read hand print.

OUTPUT. CYBERDATA has a 35-Megabyte disk that can accept data from several keyboards at once for intermediate storage, verification and manipulation. It can then transfer data from disk to mag tape for mainframe telecommunications, operating four mag drives at once. Or, you can attach it to a 300- or 1200-line-per-minute printer for use as a satellite print station.

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Survey Finds Key Entry Performance Depends on Usage

By Fonnie H. Reagan
Special to Computerworld

Productivity or performance is a necessity; convenience is a luxury. That's the story when purchasing almost anything, including key entry devices.

For the last six years, vendors of key-to-disk equipment have used productivity as the keynote of their sales pitches.

While the prospective customer was still reeling from impressive statistics on keystrokes per hour, the salesman would trot out other advantages such as data validation at the source. longer record lengths, output directly on tape, output tape blocking and file manipulation – all intended to convey the impression of greatly improved productivity.

Over the course of the same six years, Datapro Research Corp. has had the opportunity to evaluate dozens of key-to-disk data entry systems and talk with many hundreds of users of keypunches, key-to-disk systems and other data entry equipment.

Our subjective impressions were that the key-to-disk systems do provide a great number of useful features and should live up to the claims for increased productivity. But we also found, it seemed, that many of the features such as longer record lengths and table lookup, for example, have only started to be used extensively within the last year or so.

It is not difficult to rationalize reasons for the slow acceptance of the powerful data validation and record-length features of these systems.

Existing user programs running on the mainframe were already geared to specific input procedures. And the procedures for gathering and recording data for input preparation were well established.

Users do not respond well to the company pressures evident when the DP department shuts down for a while to convert to new procedures. It has to be done on the fly.

Productivity and Features

Subjective conclusions and rationalized reasons are great for discussion, but do not carry the credibility hard facts do. In June 1975, Datapro surveyed its subcribers to assess current user satisfaction with particular key-entry equipment and establish usage patterns. The responses to that survey provide a means to address the questions of productivity and feature usage.

In total, the survey attracted responses from 400 users with a total of 823 products representing 6,684 keying stations. Represented in the survey were keypunches, key-to-disk systems, key-to-diskette units, key-to-tape units and key-to-cassette units. This base of information includes users' experience with unbuffered keypunches (IBM 29), buffered keypunches (IBM 129), key-to-disk systems (all models) and key-to-diskette units (IBM 3740).

Regarding productivity, we asked the users to state the data volume both in terms of records keyed per day per keying station and keying rate in keystrokes per hour. Further light was shed on the question of productivity through questions on average record length and the percent of each record that was manually keyed.

Questions were asked about specific data validation and editing features to gain insight about the degree of utilization of these features.

In response to the question on records per day per keying station, the users responded as follows:

	Under 750	751 to 1,500	Over 1,500	No. of responses
Unbuffered keypunch	62%	23%	15%	123
Buffered keypunch	30	37	33	128
Key-to-disk	23	44	33	148
Key-to-diskette	32	29	39	47

To the question about keying rate in keystrokes per hour, the users responded as follows:

	Under 5,000	5,001 to 10,000	10,001 to 15,000	Over 15,000	No. of responses
Unbuffered keypunch	21%	49%	28%	2%	92
Buffered keypunch	10	48	36	6	109
Key-to-disk	3	47	41	9	151
Key-to-diskette	12	30	46	12	41

There is no direct correlation between these two groups of figures. Remember that in the first chart, the record volume is based on a day's output. The second is based on the productivity while working. If a device is used only one hour a day, it may be blazingly fast without producing many records.

A more thorough understanding of the figures presented in these two charts can be gained by taking a look at the next two.

In response to our question about average record size in characters, the following distribution was obtained:

	Under 20	21 to 80	81 to 150	Over 150	No. of responses
Unbuffered keypunch	56%	44%	0%	0%	154
Buffered keypunch	46	54	0	0	160
Key-to-disk	20	45	31	4	165
Key-to-diskette	24	43	33	0	63

The apparent disparity between the figures for record volume, which indicated similar output from buffered keypunches and key-to-disk systems, and keying rates, which showed a slight edge for the key-to-disk units, can thus be resolved to some extent: record lengths tend to be longer when using key-to-disk systems.

But what about relating the number of keystrokes per record to the length of the record? Both keypunches and key-to-disk systems include provision for automatic duplication, which can make the number of keystrokes per record lower than the number of characters in the record. In response to just that question, our subscribers indicated the following ratios of number of keystrokes to total record length:

	0 to 0.25	0.26 to 0.50	0.51 to 0.75	0.75 to 1.00	No. of responses
Unbuffered keypunch	10%	18%	45%	27%	124
Buffered keypunch	4	26	44	26	141
Key-to-disk	2	27	43	28	153
Key-to-diskette	2	24	48	26	58

The numbers are surprisingly similar for the four types of devices represented. But the surprise diminishes if one takes into account that the newer types of devices are probably using procedures set up for the older devices they replaced. Given similar procedures, the numbers would have to be similar.

Taken as a whole, the charts tend to support the view that key-to-disk systems are faster or more productive than keypunches. However, the buffered keypunches acquit themselves quite well.

In response to questions about usage of specific data validation features, 149 key-to-disk users indicated the following frequencies of usage: batch totals were used by 71%, zero batch balancing by 63%, check digits by 52%, value checking by 40%, range checking by 46%, table lookup by 38% and reformatting by 71%.

In the early days of key-to-disk systems, the users may well have just been looking for increased productivity, but it is quite clear many of these users have now found the data validation features to be useful tools.

Larger installations will surely go the way of key-to-disk for centralized data preparation. However, a substantial portion of the load will be shifted to outlying locations through distributed processing and data communications.

At the remote points, there will be both key-to-disk systems batching data for transmission to the central facility and intelligent terminals that will enter data to the central facility in more of an inquiry/response fashion.

The introduction by IBM of the 3760 key-to-disk configuration of the 3790 communication system will have an impact. Prior to the 3760, key-to-disk meant transcription to magnetic tape for transfer to the host computer. With the 3760, the transfer of batch data is made over a computer I/O channel.

It is an interesting blend of IBM's years-long penchant for on-line data entry and recognition that the host processors couldn't really handle high-volume data entry from multiple sources very efficiently.

Viable Alternatives

Provision by the independent key-to-disk vendors of an option for channel connection instead of or in addition to output to tape could provide users with two viable alternatives. The disadvantage of the on-line connection in place of magnetic tape is that it reduces the flexibility for the key-to-disk system to do file manipulation, which is well within the capability of many systems.

For smaller installations, the rapid emergence of the multiuser minicomputer configuration allows data entry and data processing to be combined interactively in transaction processing. Many installations will find this an attractive solution to their DP needs.

Continued growth of sophisticated applications loosely grouped under the label of data base management points to increased data gathering to support the increased data manipulation.

Meanwhile, the lively spirit of competition among mainframe vendors, intelligent terminal vendors, key-entry vendors and minicomputer vendors ensures the continuation of the rapid evolution of new devices and techniques for data entry.

Users will need to carefully match their needs to the many viable alternatives to reap the promised benefits.

Reagan is a research director for Datapro Research Corp.

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For Manufacturer

Distributed Processing Eliminates Data Entry Bottleneck

Special to Computerworld

NORTHRIDGE, Calif. – How does a company eliminate the data entry bottleneck?

Teledyne Systems Co., a maker of special-purpose computers, navigation systems and hybrid circuits, has apparently done it by switching to a distributed DP network featuring key-to-disk source data entry, according to Ester E. Boydstun, manager of DP systems.

"Since May, when the system was installed, we have dramatically reduced our turnaround time, and we've been able to eliminate an entire third shift, which more than offsets the cost of the equipment," Boydstun said.

The company is holding its entry errors now at less than 1%, even though much of the data verification work has been eliminated. DP is now being done with fewer personnel than were needed two years ago when the DP workload was 18% lighter, Boydstun said.

Data 100 Corp.'s Keybatch system permits data to be entered directly from raw source documents at several sites in considerably less time than it formerly took keypunch operators to enter the same data.

The system features a Model 78 and a Model 74 programmed terminal supporting seven local keystations, two of which are located in separate user departments several hundred feet away from the central processing site here. These provide input through regular coaxial lines.

A pair of remote keystations is located at a plant in Culver City, some 20 miles away. These interact with the terminal processor here through standard dial-up voice-grade lines.

All keystation input is entered onto a 5M-byte disk. The dual processors permit data entry to occur concurrently with batch processing. The Model 78 employs a dedicated 9,600 bit/sec line and communicates with an IBM 370 located at Teledyne-Ryan in San Diego.

Hand Delivery of Cards

The network replaces an IBM keypunch system using Model 129 and 029 keyboards. Source documents at that time had to be physically delivered to the punches, and the punched cards were carried to the DP center for batch transmission to San Diego.

Reports were often delayed, and the processing workload typically piled up for handling during the more expensive and now-eliminated third shift.

That was too cumbersome a method for a company with Teledyne's Systems' considerable DP requirements.

The 600 line/min Data 100 printer here hammers out an average of 6.4 million line/mo.

Since January 1974, when the company was actually hauling data around from service bureau to service bureau for punching as well as processing, Teledyne Systems has developed a full-fledged inhouse capability.

Boydstun's strategy in training keypunch people to operate key-to-disk equipment was to set up the programs at first to look as much like the IBM 129 keypunch formats as possible.

Only later, after the operators had become accustomed to the video display approach, were the programs changed to take advantage of table lookups, zero batch balancing, cross-footing and other editing features of the equipment.

There was a learning curve of about two weeks during which operator efficiency dropped and then rose to surpass previous levels, according to Boydstun. General keystroke efficiency seems to have improved by about 11% and is continuing upward, he said.

Boydstun is now convinced distributed DP is the wave of the future. "I feel very strongly that centralized data entry is a concept that has gotten too expensive to survive," he said.

Net Collects Data On Firm's Inventory

Special to Computerworld

CHICAGO – Collecting variable production and inventory control data and feeding it into a highly sophisticated and automated production system can be a challenging job of systems design at any time.

But when the data collection involves some 30 remote job sites in the world's largest cold roll steel mill, the problems would seem to be great indeed.

At the Indiana Harbor Works of Inland Steel Co., however, a basically simple and functional answer has been designed that keeps the information flowing at all times on all variables involved in the production and inventory control of the approximately 150,000 tons of steel that are in process at any one time.

The basic information system for collecting and feeding back data throughout the 200-acre mill is an IBM 1030 network, with terminals set up at 30 job sites.

In addition to the nonvariable information, however, the production process entails the reporting of variable data such as changes in the mix process or in line speeds.

This variable information is entered at each of the 30 job sites on a Wright Line Co. Model 2600 punch.

As information on changes in the mix process or line speeds is read, it is encoded by the job site attendant on an 80-column card by means of the 2600 punch.

The attendant inserts the card, which has been precoded by the DP center, and punches the information in the appropriate column. The card is held in place by an adjustable card locator and can be moved to any column by engaging the carriage release.

Multiple punching in one column is accomplished by either holding down the space key to suspend all spacing and depressing the required keys or by depressing any number of keys simultaneously.

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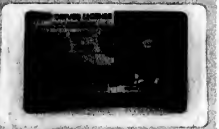

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This same system provides comprehensive pushbutton reports, which summarize the day's transactions of each deputy registrar: The type of licenses issued, the numbers, the related endorsements, the fees, and the disposition of each application. It relates the day's financial income to the transactions that produced it. It provides name and address reports on all licenses issued or refused.

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Not Only Productivity Improved

Unquantifiable Factors Gild the Key-to-Disk Lily

By Teri Morehart
And Adele Gronbach
Special to Computerworld

SANTA MONICA, Calif. – There is perhaps no more richly researched area in all of DP than the cost savings achieved by replacing keypunch operations with key-to-disk.

Innumerable studies have been made by companies throughout the country, measuring output, reducing it to such categories as keystrokes per hour and then deriving the increase in productivity.

Since these studies showed productivity increases from 25% to 50%, they served as a great stimulus to the key-to-disk industry and were widely reported. Still, most of them had odd footnotes, such as: "Does not include savings realized by DP or user departments from lower error rate" and "No factor included for costs of employee turnover."

This was certainly predictable, engineers being engineers. After all, since abandoning keypunch operations in favor of key-to-disk was clearly shown to be cost-effective based on readily quantifiable data, why gild the lily by adding in factors that were much more difficult to measure?

Since management was clearly going to make the switch based on these productivity increases, what was the point in refining the data to show that the 50% increase was really 62%.

This fact, more than any other, has hidden the revolution that has transformed yesterday's keypunch room into today's "keyprocessing" department.

The keypunch room of 10 years ago resembled a Hong Kong sweat shop. Scores of keypunch machines were clustered in a large room off in a corner somewhere, the noise was incredible and confusion ran rampant.

Chips from punched cards and torn-up cards littered the floor, and the biggest disaster was a dropped stack of cards which would scatter among this debris.

It took a very skilled and experienced supervisor just to keep the work flow moving. Since verifying was done on a different machine then keying, there was an ever-present danger that verifying work might stack up, and keypunch operators would sit idle, waiting for the verifiers to catch up.

Conversely, if major errors were detected, either by the verifiers or the DP center, an unanticipated workload would be added.

Experienced supervisors would estimate a typical operator would produce about 8,000 keystroke/hour, with about a 1% error rate. Trainees, however, had a much lower keying speed and their error rates often were as high as 5%.

True, an operator's output was measured, but it was done by a ruler. Whatever the complexity of the job, the operator's performance was assessed by the height of his completed cards. Only the supervisor's qualitative judgment would moderate that "inches-per-shift" criterion.

For supervisor and operator alike, then, the entire environment was frantic and dehumanizing.

It was clear (or should have been) that it was time someone gave this problem the attention he had been reserving for selecting a faster mainframe.

Unfortunately, companies first bought key-to-disk systems for entirely different reasons.

Appalled by the soaring costs of keypunching, these companies became actively interested in finding a way to increase the efficiency of this operation. The first interest in key-to-disk systems was totally based on this consideration.

All of those productivity studies concentrated on such factors as:

- Faster keying possible with an electronic keyboard.
- Automation of much of the verification process.
- Elimination of card costs.
- Reduction of downtime to less than 1%.
- Reduction of demand on the mainframe.

Those were significant factors, of course, and they resulted in savings that stimulated company after company to convert from keypunch to key-to-disk equipment.

Still, while this new equipment certainly introduced major efficiencies, it did not, in and of itself, directly address the root problem of operator dehumanization.

Soon, however, operators began to understand the power and flexibility of the new system and began to see themselves in a much more professional light than in the days of keypunch machines.

Many devised ways to make better use of the system – ways that hadn't occurred to the manufacturer, who got valuable feedback that helped optimize both hardware and software.

In other words, the operators became motivated to improve their performance; the employee turnover problem was sharply reduced.

To reinforce this new pride and motivation, companies provided an office atmosphere, transforming the old keypunch room into a modern keyprocessing department.

With a Computer Machinery Corp. 1800 system, for example, as many as 64 keystations, and with multiple systems even more, may be in that one room, but there is none of the old confusion and clutter.

The supervisor sits at his desk-styled console containing a control panel and command console. Nearby is other equipment – magnetic disk units, magnetic tape units and a line printer.

The operators key at top speed with their electronic keyboards.

Verification is performed at the same keystation, and it is a much simplified process. Check digits supplied by software sharply reduce verification requirements for jobs such as payroll, invoicing and inventory.

For order entry or accounts payable jobs, the auto batch balance feature automatically validates the numeric fields the operator keys against reference totals entered at the beginning of a batch. All in all, verification is a much easier task.

If a surprise crash job comes in, an operator simply closes out a batch temporarily, processes the crash job and then resumes work on the original batch.

If the surprise job is really a crash, one operator can pass the source documents to a second operator, and, by use of the write/verify overlap feature, they can write and verify batches almost simultaneously.

Other available functions and reports aren't just fancy features engineers dreamed up; they are real tools supervisors have asked for and use every day, including:

- Up-to-the-minute knowledge of the status of everything in the system through status reports: disk status, format status, job status, keystation status, operator status, event log, maintenance log and maintenance report.
- Total backup capabilities through supervisory procedures such as batch save reload, library save/reload and system save reload.
- The capability to tailor the system to individual needs of each user through a performance optimizer, a system priority feature, a system resource allocator and a tape code compiler.
- The capability for extensive "cleaning up" and reformatting of data through formattable edits, programmable edits using Cobol and RPG-II in the background.

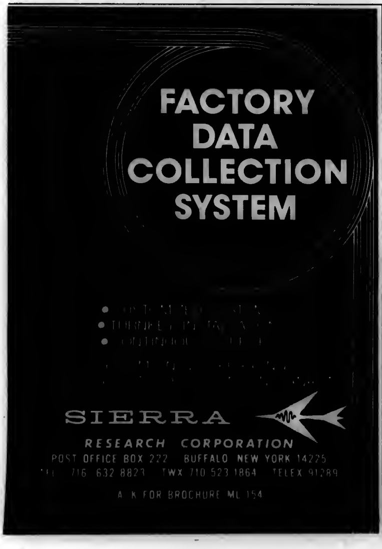
The supervisor can also obtain reports that enable him to analyze productivity by operator or may also get statistics that tell him the productivity of the entire keyprocessing department. For example, a job analysis report provides total statistics for each job, and allows the supervisor to assess the relative difficulty of jobs.

This not only permits a realistic assessment of operator performance, but also indicates any jobs that should be redesigned to permit higher productivity.

The job analysis report shows, for each job:

- Total records and total hours required to write and verify the job.
- Keystrokes per hour and records processed per hour.
- Job standards for writing and verifying records.
- Various cost data.

Morehart is manager, special projects and Gronbach is product manager, CMC 1800, for Computer Machinery Corp.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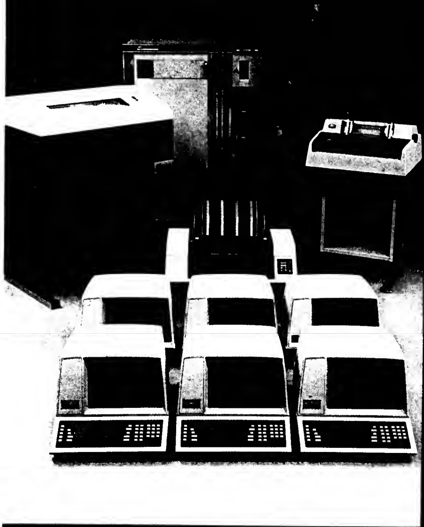

Raytheon's new PTS/1200 distributed processing system gives companies with extensive branch operations new independence from centralized information handling.

The versatile, cost-effective PTS/1200 system allows remote sites to perform their own:

- source data entry and pre-processing, including editing and validating;
- file and record maintenance — creating, accessing and updating locally stored data;
- unattended two-way communications, either in point-to-point or multi-point networks;
- stand-alone batch processing — and disc storage up to 20 million bytes of capacity;
- fast, flexible report printing, in many formats;
- 3270 terminal emulation on-line with 360/370 computers.

Ready-to-use software gets your data up fast — and you can program your own applications easily. The system can utilize up to 24 terminals simultaneously. It reduces computer line costs and forms costs, expedites data retrieval and reports, improves productivity and requires minimal operator training.

A demonstration says it all. To arrange that, write to Raytheon Data Systems, Marketing Department, 1415 Boston-Providence Turnpike, Norwood, MA 02062 — or telephone 800-225-9874 (toll-free). When you build better information processing systems . . . **the Word gets around.**

INTELLIGENT TERMINALS MINICOMPUTERS AND TELECOMMUNICATIONS SYSTEMS

RAYTHEON DATA SYSTEMS

Complex System Unneccessary

User Data Input Proves Economical in Small Network

By Charles W. McKellar
Special to Computerworld

NORTH KINGSTON, R.I. – A common belief held by small- to medium-size DP shops is the use of key-to-disk, key-to-tape, etc. is only justifiable in large installations.

This belief is particularly valid in those small shops (five to 10 machines) in which a portion of the data entered is through turnaround documents such as job packets, etc.

Although some data entry systems are economically justified when as few as five machines are replaced, there remains a significant number of users who, while having made significant progress in the area of computer applications, have failed to make use of available hardware to improve the flow of incoming data – particularly that data required to update major files.

Shortly after we installed our first CRT terminals, a problem which had always been present became more pronounced. Once the users had the capability to view firsthand the contents of a given inventory, structure or routing record, the timeliness of the data in the file became more crucial.

Maintenance to the various files had to be submitted in sufficient time to permit keypunching and verification prior to the scheduled maintenance run that night or be delayed until the following day.

This required the establishment of an unrealistic cutoff time for all maintenance data.

In reviewing our procedures and exploring alternatives, we felt that not only were we in DP not providing the level of support required by the users, but were, to some degree, adding to the cost of data entry by requiring input data be transcribed to special forms which were designed to aid the keypunch operator.

CRTs Correct Problem

The CRTs installed to support the data base inquiry system, by the very nature of the application, were subject to random usage with frequent periods of idle time. But the CRTs also appeared to be the logical vehicle to correct the condition.

Basically, we provided a relatively simple system which permitted an operator to place the CRT in a data entry mode and display a menu from which to select the format of the data to be entered.

The selected format was then displayed. All fixed data was displayed, along with indicators of the blanks which were to be filled.

The completed screen, when transmitted, was written as an 80-character record on disk. Procedures included an easy restart procedure, security codes and audit trails.

Minimal Bells and Whistles

The system was developed as a straightforward accumulation of incoming maintenance data. The use of whistles and bells were minimal and the system performed only limited editing. The computer system at that time was an IBM 360/40 with significant core restrictions that precluded much of the editing found in most key-to-disk systems.

This core restriction, coupled with our desire not to disturb existing systems, led us to the decision not to modify existing programs.

Instead, the data entry program which produced the daily audit list also punched the accumulated transactions which were then processed normally.

The system, while not sophisticated, filled a very real need on the part of users while reducing overall data entry costs.

The CRTs which were installed for the purposes of file inquiry, were readily available to the user to enter data. No longer was data transcribed, keypunched and verified prior to processing.

The acceptance of the system is evidenced by the number of transactions which are now entered directly by the user. The premise that no one knows his data better than its owner has proven valid.

Costs have been reduced while providing better service which, after all, is the name of the game.

During the next few months, we will be converting from Bunker Ramo 2206 local terminals to Sanders 8170 series terminals. At that time, we will expand our system to include Turnkey Associates' Keymaster, a key-to-disk system which operates under control of Turnkey's Taskmaster and is designed to use installed CRTs as entry devices.

McKellar is manager of data processing for Brown & Sharpe Manufacturing Co.

THIS CARTRIDGE IS UNUSUALLY PRECISE.
AT $4400; THE TERMINAL THAT ACCEPTS
IT MIGHT WELL BE REVOLUTIONARY.
INTRODUCING THE HEWLETT-PACKARD
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Card-Based Inventory System Keeps Retailer Informed

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ABINGTON, Pa. – The morning after a recent robbery at a photo equipment and supplies company's retail store, the president was able to hand police a complete list of missing equipment.

A card-based inventory control system utilizing the turnaround card concept and based on the use of a Model 9610 interpreting data recorder manufactured by Decision Data Computer Corp. made this information, by manufacturer, product description and serial number, available immediately to David Harrar, president of Larmon Photo, Inc.

The system was launched slightly over a year ago when Harrar found a nearby company with time available on an IBM System/3 to handle accounts receivable processing for his expanding business.

Growing familiarity with the versatility of the 9610 in the course of this work, including its punch suppress, interfile and automatic reproduce capabilities in addition to basic keypunching and verifying, generated the idea for the inventory control system.

As it finally evolved, the system tracks flow of items selling for $20 or more from day of receipt through sale and, in most cases, customer follow-up.

Color-Coded Cards

The key to the system is a color-coded set of three 96-column cards which follow an item through its stay at the company. The cards are:

- White – used as a warehouse record.
- Yellow – a transfer card, used when the item is shipped from the warehouse to one of the retail stores.
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Since 96-column cards serve Larmon as input for various accounting purposes as well as for the inventory control system, they must be coded as to function. All cards for the inventory control system carry a 5 code followed by a 1, 2 or 3 card color code, which is automatically punched and printed by means of the keypunch's reproduce feature. On the "52" (yellow or transfer card) the reproduce feature is used in conjunction with the punch suppress feature to print "transferred to store #____ and "date transferred____" without punching that information into the card. This leaves an area of the card available for punching in the future.

Two of the three cards are interfiled on the data recorder, with the third added at the computer to complete the set. Harrar pointed out that the interfile capability of the equipment enables elimination of a second computer run for this purpose, providing a cost saving at the outset.

Collated three-card sets are kept at the warehouse awaiting arrival of goods.

Cards 'Married' to Produeta

When a shipment is received – cameras, for example – the card sets are "married" to specific products.

First, a master card matching the type of camera received is drawn from a master card deck that Harrar maintains for all products he sells and also uses for generation of card sets and for production of price lists and reports.

This master card contains the camera's assigned product number, description, list price, actual cost, sale price and gross profit.

This card is then read into the data recorder memory so selected information can be automatically duplicated (punched and printed or, through the punch suppress feature, printed only) while "particularized" information, such as individual serial numbers and date received, is manually keyed in by the operator to produce a color-coded card set for each camera.

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To accomplish this, the product description, a field of 20 characters, is printed but not punched, providing visual identification of the product while leaving the punch positions available for later use.

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Mailing lists generated by the system can be prepared in any configuration; by type of product sold, date of sale, by store, zip code, etc. It also serves as a customer service tool, enabling immediate retrieval of pertinent information for insurance purposes should a camera or other expensive piece of equipment be lost or stolen from a customer.

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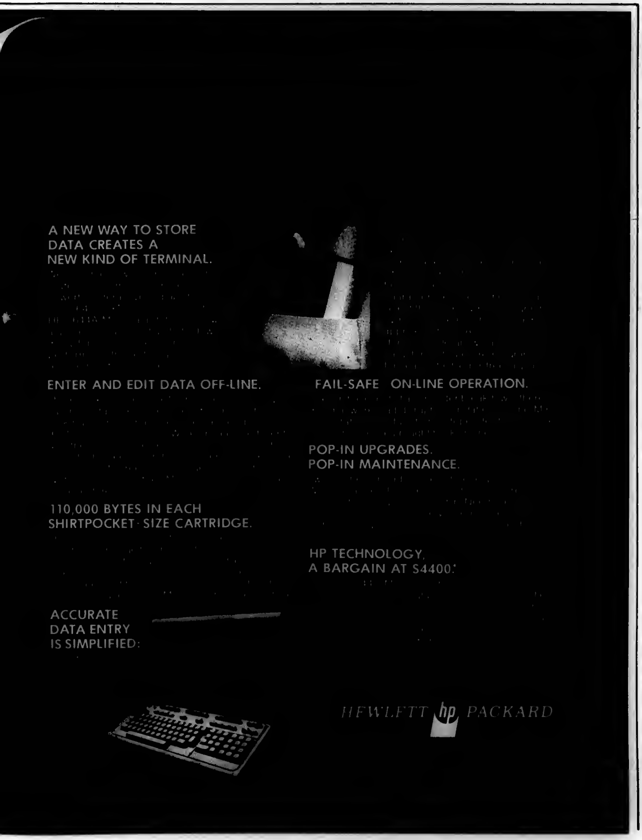
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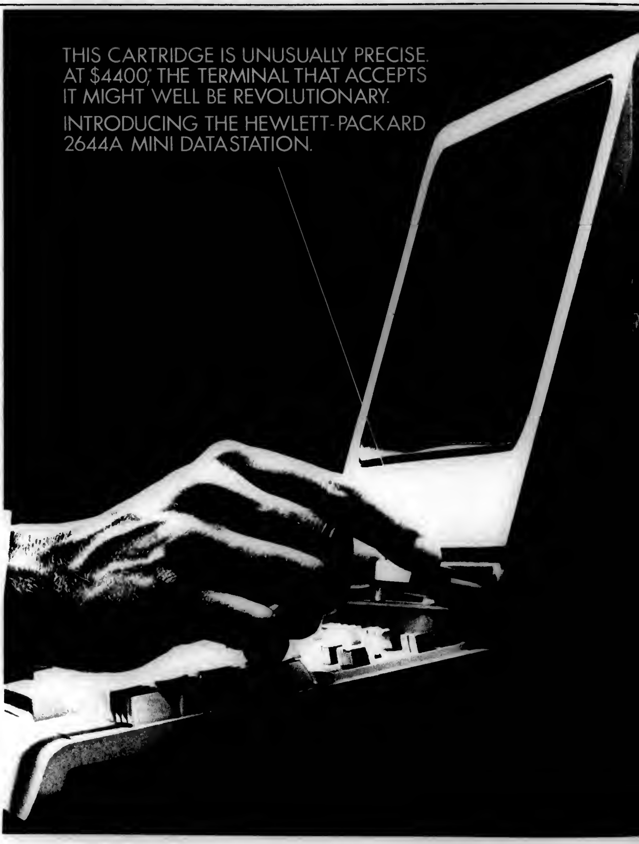
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A NEW WAY TO STORE DATA CREATES A NEW KIND OF TERMINAL.

We've added twin-cartridge integrated local mass storage to the powerful interactive capabilities of our 2640 CRT. The result is the HP 2644A Mini DataStation, a new approach to data entry that allows many functions to be economically performed off-line that previously required costly computer time.

ENTER AND EDIT DATA OFF-LINE.

There's an enhanced 5" x 10" high-resolution display. Operator fatigue is reduced thanks to familiar looking Roman characters delineated by a crisp 9 x 15 dot-character cell. Work proceeds efficiently with the aid of single key initiation of multiple functions, high speed search, character or block mode operation, off-screen line storage, a protected data switch and many other Mini DataStation convenience features.

110,000 BYTES IN EACH SHIRTPOCKET-SIZE CARTRIDGE.

That's enough for hours of typing. Precise engineering of the cartridge to HP specifications has resulted in the significantly low data loss rate of less than one byte in every 10⁸. Full-width, single-track recording guarantees that this unusually high level of performance is available at every Mini DataStation every time.

ACCURATE DATA ENTRY IS SIMPLIFIED:

By batch transmitting to the computer after data has been properly formatted and edited, efficiency is increased, errors reduced and connect costs lowered. Correct data entry is easier thanks to the DataStation's formatting and protected field capability. A choice of four character sets lets the operator select the correct written or graphic symbol instead of an awkward approximation. And an optional "forms" mode allows all your company forms to be pre-programmed for near instant, error-free display.

"FAIL-SAFE" ON-LINE OPERATION.

Even in the event of a computer breakdown, there is minimal work load disruption or data loss. The Mini DataStation can function independently until the computer can be brought back on line.

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Two latches provide access to every component. Want an added feature? Plug it in. Is there a new state-of-the-art option? Plug it in. Need a repair? Pop out the old. Plug in the new. There's even a built-in self-TEST key for an immediate go/no go verification by the operator.

HP TECHNOLOGY, A BARGAIN AT $4400.*

The HP 2644A Mini DataStation represents significant increases in throughput, data accuracy and flexibility at a price that could revolutionize your terminal operations. It is built to HP's exacting standards and backed by HP's reputation and worldwide network of sales and service offices. For complete details, call your local HP office or write.

HEWLETT hp PACKARD

In Necessary Time Frame

System Helps Firm Capture Television, Radio Ratings

By James R. Harry
Special to Computerworld

BELTSVILLE, Md. – To a firm which is one of the nation's largest broadcast audience-measurement companies, contacting more than 1.3 million families a year to determine program ratings, the input of raw data is no simple task.

The results are the basis of the Arbitron television and radio rating reports. The raw data is obtained from random computer-selected households by a small booklet called a diary.

The diaries are sent to each individual age 12 and over in homes selected for radio surveys and for each television set in homes selected for television surveys. Our problem has been and continues to be the capturing of the data contained in these diaries.

Speed is of the essence in retrieving the diary data, since data gathered in radio and television surveys becomes less usable as it becomes older.

While speed is important in building the system, accuracy in capturing the data is vital to our more than 2,700 clients.

Drain on Resources

In a 30-day period, keypunch techniques generated 1 million cards that had to be read and validated by our computers and then updated with appropriate corrections.

This process was becoming a drain on our computer resources at the same time that our processing demands for other revenue-producing tasks were at their highest levels.

By January 1974, this requirement for computer cycles, together with the steadily rising cost of labor and cards, provided the thrust which led us to investigate available data entry alternatives.

First we outlined the basic goals a data entry system had to meet:

- Reduce dependency on the installed computer base.
- Provide heavy on-line editing capabilities of pertinent data.
- Eliminate hand editing of tasks done by the computer.
- Maintain the current entry levels per hour worked.
- Maintain accuracy levels consistent with the prior system.

It took a full year to complete our study of available data entry systems and to receive management approval for the recommended system.

The majority of the systems we studied would satisfy all but the on-line editing demands without major reduction in our system's capability. CDC's Cyberdata system satisfied every criteria.

Prior to placing our order, we spent two months at CDC's Minneapolis plants, writing user routines and testing the system.

We concentrated on our on-line editing criteria and the corresponding response time associated with the heavy I/O demands.

The results of this two-month period culminated with our order of three 16-terminal systems with delivery scheduled for last July.

Between order placement and equipment delivery, we continued testing the user routines on our own previously installed computers and on CDC's Cyberdata test system in Minneapolis.

The systems arrived on schedule with the first machine installed and operational within three days. Months of preliminary testing proved to have been well spent.

It took us only one week after the system was installed to build our files and begin operator training.

We have now completed processing our first Arbitron survey using the Cyberdata system. The production cycle was 35 calendar days, consisting of over 50,000 diaries containing approximately 2.5 million entries, constituting 30 million data elements.

And error rates, as calculated from extensive internal audits, were below prescribed standards.

Harry is director of operations at Arbitron.

Time-Sharing Speeds Bank's Data Entry

By Gerald J. Vorndran
Special to Computerworld

CLEVELAND – Probably the most important data entry area for businesses is payroll. And here at the Central National Bank, payroll data entry for many of its customers is being converted to "payroll time-sharing data entry."

Central National Bank, which offers customer service payroll processing, embarked on a joint venture of payroll time-sharing earlier this year with Datalogics, Inc., a time-sharing vendor.

Before payroll time-sharing, the bank's payroll customer recorded his input on preprinted forms, a computerized turnaround document or on actual time cards.

The input was then transported by the customer to one of Central's branches in a locked payroll case. Through the bank's interoffice messenger system, the payroll arrived at the bank's data center.

Within the data center and the Customer Service Division, the payroll was keypunched, key verified, computer edited and reconciled.

If errors or an out-of-balance condition existed, corrections were keypunched, and the payroll was computer edited and reconciled the second time before the final production run.

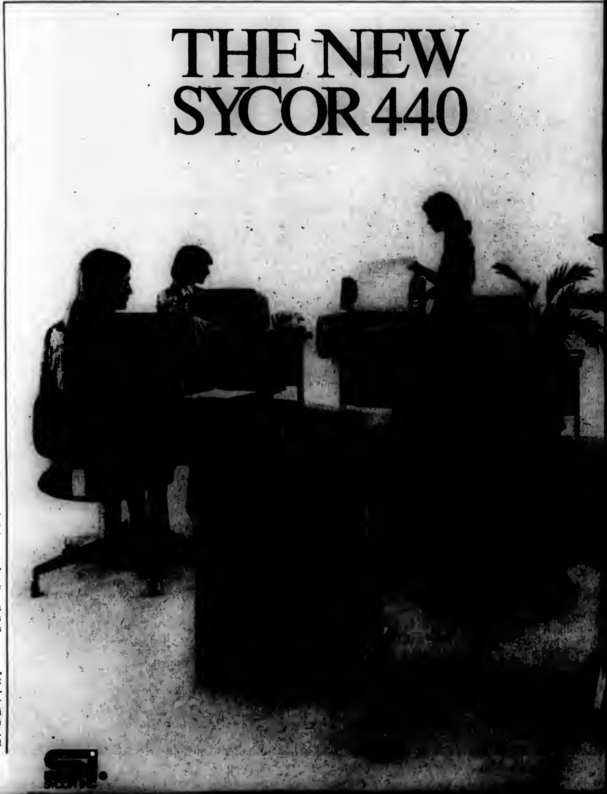
Subsequently, the finished product was delivered to one of Central's branches where the customer would pick up his completed payroll.

Time-Sharing System

Under the payroll time-sharing system, the payroll customer submits input through a CRT terminal over normal telephone lines to the time-sharing computer site. A 130K edit program and a disk mini master file are used to validate employee numbers and other pertinent information.

The customer's payroll clerk has visual

(Continued on Page S/13)



Source Data Entry Eases Patient Admissions Process

By John Hebert
Of the CW Staff

PONTIAC, Mich. – In any hospital, patient care doesn't necessarily begin or end with physical remedies.

A medium-size hospital here has improved total patient care by using intelligent data entry terminals to capture complete and accurate patient information in one procedure – at the source.

The hospital has also eliminated the need for a time-consuming insurance-form education program for admissions employees, reduced patient billing times, forestalled personnel increases and improved its cash flow.

St. Joseph Mercy Hospital installed the terminals in the admitting department last June, Jerry W. Hendrickson, the hospital's director of DP, said.

"The hospital expanded from 300 to 500 beds about three years ago, and some growth is still being experienced," Hendrickson said.

"The work volume from that size increase also has increased substantially. For example, there has been a 15% to 20% increase in outpatient admissions alone," Hendrickson said.

The hospital now receives 20,000 inpatient admissions annually, representing 160,000 patient-days, he continued.

Burdensome Process

The increased time involved and errors made in the transcribing process for this increase in patient information was burdensome, he said.

Before installing Mohawk Data Sciences Corp. (MDS) 2300 source document-processing terminals in the admissions department, the hospital relied on IBM 129 keypunches to process patient-admission, services and billing information, Hendrickson said.

"Everything that was once on the 129 keypunches we now do on our key-to-disk system," Hendrickson said.

Six MDS 2300s have been installed in the admitting department; three are in inpatient services, and another three are handling centralized emergency and outpatient admissions services.

The terminals are connected by dial-up telephone lines to four MDS 1200 keystations, which are connected to an NCR 200 CPU in the DP department.

Each terminal has 116K characters of storage which is used to execute user-written form description programs specifying processing requirements for each form type used in admitting a patient.

Admissions Procedure

Whenever possible, the patient fills in a preadmission form at home. On the day of admission, the admissions clerk sits with the patient at a terminal with a CRT screen both can read. The clerk then types the multipart admission record, questioning the patient about missing information such as guarantor or insurance coverage.

The terminal is programmed for mandatory entires, forcing the clerk to provide complete input. The terminal's CRT prompts the clerk for all pertinent information.

Under the manual system used previously, the time-consuming admission process had to be repeated over 400 times daily as each new patient entered the inpatient/outpatient departments. And discharged patients typically waited about 13 days before receiving a final statement of their complete charges, Hendrickson said.

It had taken two days for admissions personnel to fully complete the 15 multipart forms the hospital needs for each patient admission.

The forms were then routed to the patient accounting department, where operators took one day to transcribe the information for the DP department.

The information was in DP for five days, mainly because of the volume of paperwork which had to be completed. The DP department had to keypunch nine cards per patient, Hendrickson said.

After the information was loaded onto the CPU, it was processed and posted to the billing department, where the itemized bills were processed for five days after the patient had been discharged, he added.

The terminals have helped to cut about seven days off the billing cycle because the several steps required to admit and process the information on each patient – typing, manual entries, card punching and file lookups – are now done in one procedure.

The terminals have saved approximately 460 man-hour/mo in clerical work by providing immediate input to the computer.

Time-Sharing Speeds Bank's Payroll Entry

(Continued from Page S/12)

access to what is entered plus computer editing and balancing totals capabilities.

Any entry which previously could be submitted on an input form can now be transmitted, edited, changed, deleted or corrected with the CRT terminal.

All input submitted by the customer's payroll clerk may be transmitted over a period of several days at customer's convenience and without time constraints.

At a prearranged time, the payroll data at the time-sharing computer site is gathered on magnetic tape and sent to Central's data center for the final production run and normal disposition of the finished product.

This system was promoted by the ever-increasing volume of keypunching, especially during peak periods of production. But payroll time-sharing eliminates keypunching and eliminates computer site reconciling; more important, it reduces the computer site turnaround time of payroll completion by 50%.

This turnaround time is of vital importance to payroll customers. Time-sharing allows the customer more time for payroll preparation and provides overnight completion of the final product.

Who knows a customer's payroll better than the customer himself? The customer, aided by the CRT and the computer, has complete control over his payroll.

Although this system is capable of handling any size payroll, it is primarily designed to supply maximum benefits to medium and large input volume types of payrolls.

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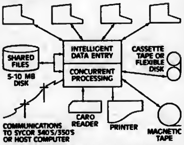
Design your own system with a variety of options and peripherals.

Supports from 1 to 8 displays. Each is controlled by the Sycor processor and is capable of performing tasks independent of other displays.



Choice of 5 and 10mb disks. Store and retrieve programs, shared files, and data at remote locations.

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There's full software compatibility with our Model 340 and 350 stand-alone terminals. Keyboards are also compatible.

Programming. One program fits three different systems—340, 350 and 440.

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Remote job entry. Use the 440 with its card reader and 300 LPM printer for large-scale remote job entry. And since the system contains a CRT and a keyboard, you don't pay extra for them.

Multi-terminal printer support. Each display can interleave print data to one printer as the data is being entered. So, you don't need a separate printer for each display.

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Intelligent Terminals End Firm's Training Problems

Special to Computerworld

ORANGE, Conn. – The installation of intelligent terminals has proved an invaluable asset in overcoming problems training field personnel in data entry for at least one company.

In addition, Saab-Scania, a Swedish car manufacturer, has been able to realize cost savings of better than 40% over previous costs for data transmission.

Saab-Scania has four regional offices located in Torrance, Calif.; Dallas; Chicago; and Jacksonville, Fla. Corporate headquarters here also serves as regional office for the Northeast.

The field offices are equipped with 8K Datapoint Corp. 2200 intelligent terminals with dual internal tape cassettes and with associated 120 line/min printers. Integral communication adapters and the dial-up network connect these units with the home office.

For data collection from these offices, the home office also uses a 2200 which is equipped with a 7-channel 556 bit/in. magnetic tape-to-cassette conversion unit. Transmission is cassette-to-cassette, and the filled spool is then converted to tape and read into the home office computer.

This network, used primarily for data entry from field offices and for transmission of management reports back to these field offices, fronts a Honeywell 1250 configuration in the Orange facility which is used for the company's general DP requirements.

"Our business at Saab-Scania is automotive sales," Martin R. Doyle, DP manager, said. "We have in the U.S. an organization of 450 dealers which we support through our four regional offices and our national office here. The primary field data inputs we get from our field offices concern dealer car sales and dealer orders for parts.

Parts Ordering Critical Task

"As with any car operation, parts ordering is, in particular, a critical and complex task, since we stock over 16,000 items. We use the Datapoint equipment as the means to get correct order information to us here swiftly, to process that data, make sure the goods are delivered as requested and, in the case of car sales, turn the data around back to the field in the form of usable, timely management information," he said.

Before installing the Datapoint equipment early in 1974, Saab-Scania used standard key-to-tape entry gear for data entry in its regional offices.

"A particular constraint with this equipment concerned the training of operators. Our field offices are not heavily staffed, and it was extremely important that we find qualified personnel and train them for the key-to-tape units.

"This training process might take as much as three weeks. If an operator left the company, that meant our operations were hampered until we could locate a new person and train him for the equipment," Doyle stated.

"With Datapoint, however, the training process is almost entirely avoided, thanks to the unit's video display and the way in which we can program a sequence of tutorial 'stages' for data entry. The operator is literally hand guided through the entry process and, should he make a syntactical or in many cases a numeric error, the machine will signal that an error's been made. I myself have trained an operator from scratch to an acceptable level in just 15 minutes," he said.

The Datapoint equipment has also been of key help in reducing data transmission costs over the telephone facilities used by Saab-Scania.

"From 1973 to 1974 the line costs for data transmission at Saab-Scania dropped over 45%, even though our volume increased," Doyle noted.

The reasons for this are three. First, the data communications is strictly from machine to machine, so we don't have the problem of personal conversations at company expense.

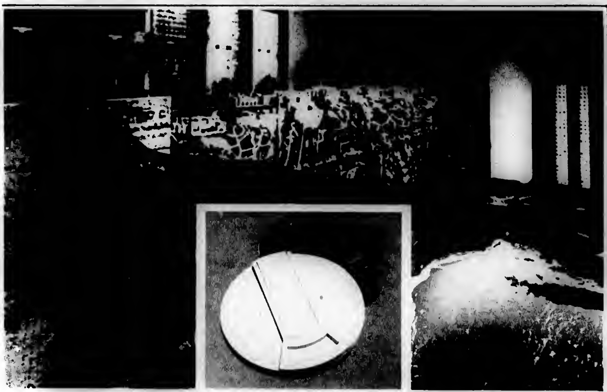
Second, in the event of carrier interrupts, the machines are programmed to automatically redial and recommence transmission from the point where the interruption occurred, not from the beginning of the transmission as was previously the case.

"And third, the terminals are programmed to handle much of the data transmission unattended and automatically overnight when telephone rates are the lowest," he said.

"We find our network especially useful in getting action management information into the hands of company executives. For example, our 10-day car sales reports are prepared on our central computer and then transmitted to our regional office managers on the 11th day morning, and this is a most useful action document for our field managers.

"Similarly, we speed new car order information from the car order system direct to regional offices through the network," Doyle commented.

While data entry and data transmission applications form the hard core of the dispersed DP network's current usage, Saab-Scania also is using the extensive local processing capability of the 2200s.



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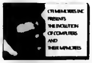

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With Automated Order Entry

System Expedites Shoes to Salesmen

HANOVER, Pa. – More business means more work, but it also means more planning – planning which often leads to the acquisition of new computerized equipment to speed operations.

In the case of Hanover Shoe, Inc., increased sales led to the acquisition of a computer-assisted data entry system.

The bulk of the company's Direct Sales Division's work is with thousands of individual salespersons all over the country.

These salespersons work on a door-to-door basis, writing orders for Hanover-brand dress, casual and work shoes and sending them to the company's headquarters for processing, according to Allan T. Young, the firm's DP manager.

"That's where the work begins, and that's where direct sales would have one day been in a serious workload crunch, if it hadn't been for new order entry procedures," Young said.

"Orders are received daily, and since 1973 when the division was started, the inflow rate has risen from a few each day to hundreds, sometimes thousands," Young explained.

Foresaw Crunch

But, foreseeing the crunch, Hanover management turned to its data processing department to come up with a plan to avert it.

"The original routine for handling orders was a manual one. Clerks received sales slips; compared them with the Hanover catalog for style, size, width, color and price; verified order accuracy and cash; and sent them on their way," Young said.

Next, the orders were processed on a proof and billing machine, where applicable state taxes and postage were entered, and the orders were totaled, filled and mailed.

Although the system then used was manual, it was effective. But, as sales continued to grow, paperwork mounted and personnel needs pressed.

"Success of the division hinged on responding to field sales' needs," Young noted. "Turnaround time has to be as short as Hanover can make it.

"After all, consumers don't have to buy shoes from one of Hanover's representatives if delivery time is too long. They can always go to a nearby retail outlet, and that would defeat the purpose the company's Direct Sales Division."

"One way we considered absorbing more of the growing workload was to have clerks keypunch the information from sales orders and run cards through the company's central computer system overnight," Young explained.

But punch cards also mean more paperwork, and they're costly; so that alternative wasn't the answer Hanover management wanted.

"Besides, punch cards take too much time, not only in actual data preparation, but in system throughput as well," Young said.

Faster throughput, then, was one quality Hanover's next order entry system had to have, "as well as the ability to take on more work without more paperwork and expand with the Direct Sales Division's demands," Young said.

Search Ends

The search ended in August 1974, when Hanover began converting to a computer-assisted data entry (Cade) system.

The system was a Sperry Univac 1900 Cade unit, which includes a self-contained central control unit, seven keystations, a disk drive and tape unit.

With the new system, operators enter order information directly into the central control unit from individual, remote keystations. Each keystation is equipped with a display that acts as a monitor for the operator.

As the orders are entered, each order is checked to make sure a legitimate style was ordered. Also, the proper tax, postage price, deposit and extended total are computed and compared with the keyed entries. Any differences are displayed on the keystation CRT. If the sales order is wrong, it is returned to the sales department for action.

At the same time, the supervisor can also monitor order entry activity of each operator as a backup measure. The supervisor transfers order files from disk to tape and delivers the tapes to Hanover's central computer facility at the close of each business day.

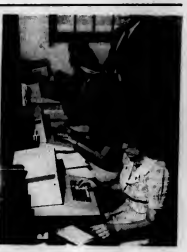
There, the information is processed overnight, labels printed and orders shipped the following day.

After a year of operation, Young has already compiled a list of benefits. "Of course, the major benefits to us will be Cade's ability to produce faster throughput and absorb more order demands in the future," he said.

"But there are others we hadn't considered at first.

"For example, there's no downtime with the Cade system. Combined with faster throughput, this means we're able to stay up with the job and keep the company's central processor busy overnight," Young said.

"The Cade system has unlimited data entry capacity, too, whereas with an 80-column punch card system for the application, data entry would have been limited. Each direct sales order record has 300 characters to it, which exceed a single punch card's capacity," he noted.



Seven keystations serve the Hanover Cade system. Alan T. Young, DP manager, is shown above.

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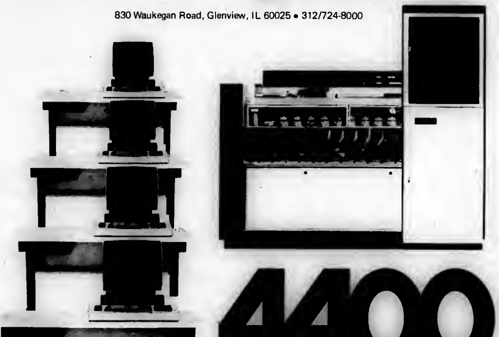

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Personnel Training Results in Greater Cost Control

By Edward Singley

Special to Computerworld

Until recently the rapid expansion of the computer field and the great demand for technicians and managers caused the people working in the data entry department to be treated as low priority for training.

But management has been asking: "What does it cost to process data on a cost-per-person basis?" The answers have indicated a need for tighter cost control in the data entry area.

Inaccurate data entered into the computer and the delays caused by retrieving the information and reentering it account for almost half of each data-handling dollar spent.

To pinpoint the principal reason for inefficiency in this area, consider the people involved.

Many data entry personnel were part of their company's manual operation and received only cursory instruction by the system supplier when the company automated.

Others, hired with little or no training to their credit, were given a briefing by somebody on the job.

That simply is not enough.

Vast sums of money spent on sophisticated hardware, software systems and high-level personnel do not guarantee a company will get its money's worth – it has to dig deeper, to the data capture area, where computerized handling begins.

A company can determine whether its data entry department is profitable by instituting work measurement and standards procedures. This basically achieves:

- Individual operator production and efficiency increases.
- Total departmental production statistics.
- Accurate job load forecasting.
- Elimination of time-consuming clerical assessments.
- Accurate time and cost estimates for data preparation.

Proficiency Tests

A good way to measure an operator's performance is by giving him a proficiency test to discover his key depressions per hour (KDPH) performance in keypunch, key-to-tape or key-to-disk operations.

The test should be straight copy and measured so that the end of each line has an accumulative total of the number of characters stroked.

To arrive at the number of KDPH for a 10-minute exercise:

- Count the number of key depressions of the last line typed by the operator.
- Add the total number of key depressions from the preceding line.
- Multiply by six to get the KDPH.

This method should only be used as a guideline, since one-third to one-half of an operator's speed is lost on production documentation. After all factors have been considered, operators producing 15,000-plus KDPH on alpha and/or numeric material can be considered reasonably well qualified.

It is not wise to consider keyboard dexterity alone. Emotional job fitness is just as important. An operator's attitude, posture, the physical environment, layout of the data entry department, job handling routines and distraction factors all contribute to the effectiveness or ineffectiveness of a production activity.

Attitude problems can be caused by an operator's lack of confidence in his skills. This has often been the case when equipment is upgraded; adaptation of methods causes confusion among operators when no more than cursory instruction is given.

Often, too, the layout of the department may not encourage a high level of production, and at times only a rearrangement of the equipment is needed to reverse this situation.

Job distribution can also be a problem if the operator has to continually collect his work from the supervisor's desk, thereby causing continual traffic between the machines and adding to other distractions.

Supervisor an Asset

From a long-range view, the supervisor is a very valuable asset. Don't choose a person for this position because he happens to be the most productive on the machine; choose a person who is able to handle people and is well organized.

If training is given, the supervisor should work with the people conducting it so he can maintain the grades of the operators being trained and train future people. Let the supervisor control the work flow and distribute it to the operators.

Encourage the supervisor to have a brief discussion with each of the operators on a monthly basis to review their performance and develop their work needs: Is the CRT programmed to be most effective? Perhaps the fields could be placed in an improved position? After all, it is sometimes the operators themselves who know best what they need.

In addition to resolving the cost problems associated with data handling, training in the data entry area should also consider other factors which form

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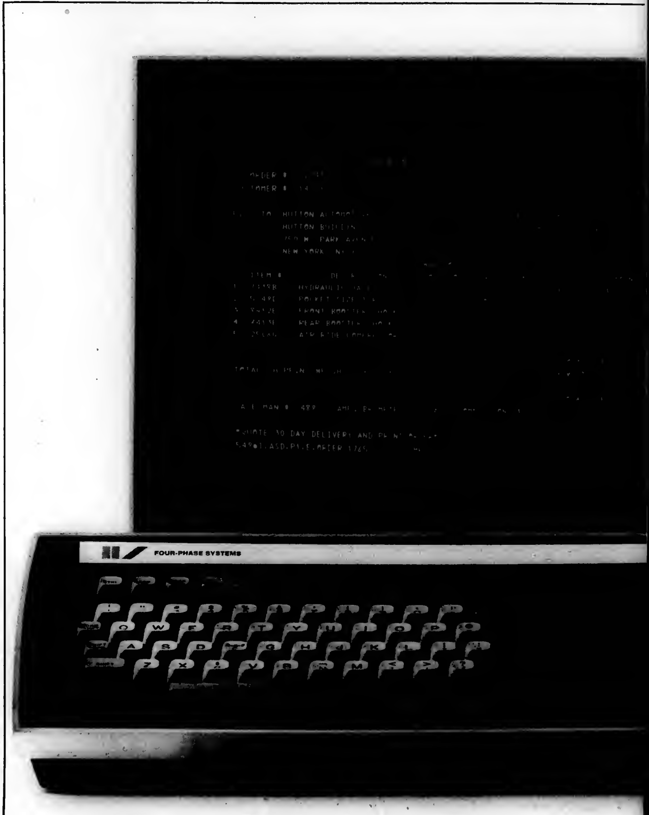
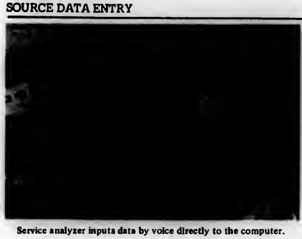




Service analyzer inputa data by voice directly to the computer.

To Capture Service Data

System 'Listens' to Analyzers' Input

Special to Computerworld

TECUMSEH, Mich. – Tecumseh Products Co. is using one of the latest methods of data entry – voice input – to improve its warranty management program.

Good system designers have always attempted to capture data in computer-compatible format at the source. Any elimination of redundant recording reduces costs and transcription errors.

In many hands-busy operations, it is not possible to key data at the source or manually encode it for later keypunching.

People who work in these environments have not been trained, nor are they qualified to perform keypunch operations, and neat handwriting is not a prerequisite for the job.

In addition to manually recording data, this information must be keypunched, creating an unnecessary step.

At Tecumseh, unit analyzers working in the service department communicate their data directly into a computer via voice data entry.

Refrigerant compressors manufactured by Tecumseh are sometimes returned for service analysis. In order to classify the type of compressor, customer and other pertinent data, each service analyzer speaks data directly into a microphone via Threshold Technology, Inc.'s voice data entry system.

The information required from analyzers is basically the same as in the past; however, the handwriting of that data has now been eliminated.

When the analyzer evaluates and compiles the data from the refrigerant compressors, he is, in essence, dealing directly with the computer.

The Threshold system accepts the spoken word and outputs the data into a computer-compatible format. The data processing system then converts the data to documents for mailing to Tecumseh's customers.

Display Prompts Operator

The operator wears a microphone for voice input and has a small interactive alphanumeric display for verification of his input as well as feedback and next-step information. The display works with the operator telling him what information it wants next.

The operator sees the message that is displayed, looks at the metal tag on the compressor, and speaks the data into the system. If he discovers a mistake via the verification on the screen, he simply says "ERASE" and reenters the proper data.

The voice data entry system also performs contain checks and comparisons (such as date of manufacture vs. warranty claims

(Continued on Page S/19)

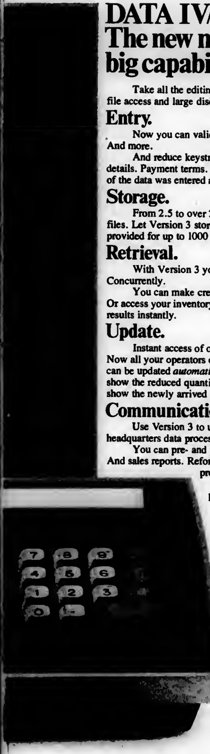
Training Results In Cost Control

(Continued from Page S/16)

part of an integrated and cohesive department:

- Job codes: This entails defining the work once it is received into the department and establishing methods for passing it through the system as quickly and effectively as possible.
- Definition of data requirements and source documents: The result is to ensure compatibility between data input requirements without excessive expenditure for systems modifications.
- Study of work flow: This involves studying each job performed in the department and arriving at a method so that any task will be performed at its optimum level.
- Streamline input procedures: This relates to the task of examining material before it reaches the data entry department. In some areas these functions need restructuring to perform productively.

Singley is manager of the Commercial Division at Advanced Keyboarding Systems, Inc., – a data entry operator-training company.



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With Version 3 you don't need separate systems for entry and retrieval. Now DATA IV/70 does both. Concurrently.

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Instant access of obsolete data isn't very useful. That's why we've given Version 3 online update capability. Now all your operators can access the same current information. As each transaction is keyed, master file records can be updated *automatically*. For example, when new orders are entered, inventory records can be updated to show the reduced quantity on hand. And when warehouse receipts are entered, inventory records can be revised to show the newly arrived stock. It's all automatic with Version 3.

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Used in Statistics Gathering

Key-to-Disk Helps Keep Score for Automotive Industry

CINCINNATI – Greater efficiency, lower costs and fewer errors are the advantages R.L. Polk & Co. here has experienced since it switched to automatic editing to prepare data for its large computer system.

Known since 1922 as the "scorekeeper for the automotive industry," the Cincinnati Division of Polk now is using two key-to-disk data entry systems rather than electric typewriters, preprinted forms and optical scanning equipment.

The division gathers, tabulates and stores data on the more than 11 million new cars and trucks purchased each year in the U.S. and Puerto Rico and then prints monthly and special-order statistical reports for car and truck manufacturers.

Data is gathered from state vehicle registration information.

"We eliminated the checking and scanning operations in our former four-step process by switching to the Inforex 1302 system about two years ago," according to Thomas V. Maloney, vice-president and general manager of the division.

"The system has enough logic to provide a validity edit of the very information we need – the factory-assigned vehicle identification number for cars and the manufacturer's gross vehicle weight for trucks," Maloney said.

The division inputs more than 20,000 records per day on its two systems, which have a total of 20 keystations. The two systems are dedicated exclusively to inputting data on cars and trucks and are used on a single shift, Maloney said.

"The operators first key in the 13 to 16-character vehicle identification number, then the vehicle data, including year, model, make and series," Maloney explained.

"Then the operator again keys in the ID number, which is matched and validated by the logic in the system before the entire record is accepted.

"This is a two-step process," he said. "Previously, we typed the information onto a preprinted form, checked and edited it, then ran it through an optical scanner to transfer the data to tape.

"We've eliminated two steps and also made the checking, editing and correcting functions much easier with the system."

"When we switched systems, we brought down the cost of data entry appreciably," Maloney said. "We eliminated the forms, checkers, control clerks, scanning and other costs."

The dedicated key-to-disk system also has produced greater efficiency and higher production – for a couple of reasons. The equipment is easy to operate; errors are easier to correct. Both of these factors add to productivity.

The division also pays its keystation operators on an incentive plan, adding a bonus to the paychecks of about three-fourths of the operators because of their fast, accurate keystroking.

"With more keystrokes per hour, we win in production and the operators win in additional money," Maloney explained.

The magnetic tapes produced by the key-to-disk systems are loaded onto an IBM System 370/158, which processes all the data for the division.

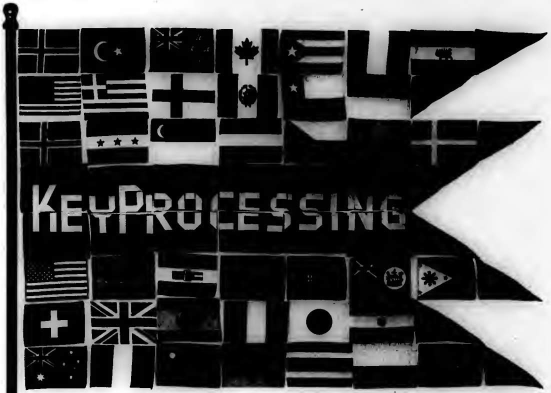
The standard statistical report produced from the vehicle registration data is a monthly census by cities of cars and trucks registered by manufacturer, model, series and price class. Trucks are listed by manufacturer's gross vehicle weight by manufacturer.

Check Sales Performance

"This is the data base we work with," Maloney said. "Half of the reports we print each month are for specific car divisions.

"Companies then can analyze performance by marketing areas, sales zones or geographical areas. This data helps the manufacturers in their production planning and marketing."

The source material is computer magnetic tape and microfilm copies of vehicle records. "We only keystroke those that are not provided on computer tape," Maloney said. "The tapes are edited by us and changed into our format."



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Moving Data Entry to Source Lowers Firm's Cost 39%

By James L. Downs
Special to Computerworld

KAUKAUNA, Wis. – Switching from keypunches to IBM's 3740 key-entry system gave Thilmany Pulp and Paper Co. a 70% increase in volume with a 48% reduction in labor hours – and the total cost for data entry is now 39% less than in 1972.

In the early 1960s, Thilmany installed a unit record system for accounting and manufacturing applications. The number of people involved in the operations end of DP grew from six in 1963 to 12 in 1967 when an IBM 360/40 was installed.

As one would expect, the growth was principally in the data entry section.

By March of 1973, the data entry section consisted of eight full-time and three part-time data entry employees working two shifts, producing approximately 50 million strokes annually (equivalent to about 500,000 cards punched and verified).

This work was being done on seven IBM 129 keypunches. The approximate cost for data entry was $70,000/year at year-end 1972. The total labor hours in data entry was 17,500 for the same year.

Installation of 3740

In the spring of 1973, Thilmany made the decision to install the IBM 3740 system in its data entry section. The original concept was to initially install the devices centrally, but eventually move them to other departments for direct entry by the user.

This system has had a tremendous effect not only on the efficiency of entry, but also on the user in receiving information on a more timely basis.

The initial installation was on a one-for-one basis; for each IBM 129, one station of the IBM 3740 system was installed. Approximately one month prior to the planned conversion date, a single station was brought in and the data entry supervisor was trained.

During the next three weeks, all applications (currently 244 different ones) were converted to the IBM 3740 format and documentation changed. Additionally, all operators were given some general training on their use.

Over a weekend, all IBM 129s were removed and IBM 3740s put in place. On a Monday, all data was entered through this system and, by Wednesday, all was proceeding smoothly. Since that time, the data entry staff has been reduced by attrition and transfers to four full-time operators and no part-time help.

While the staff size has been reduced and all work is being performed on one shift, the volume has grown from 50 million strokes to 85 million yearly.

The data entry operators now produce an average of 17,500 stroke/hour with some applications as high as 30,000 stroke/hour. The total labor hours forecast for 1975 for 85 million strokes was 8,500 hours.

The approximate cost for data entry in 1975 is $43,800 or 39% less than in 1972.

In July, Thilmany converted one of its IBM 3740s to the programmable version and began development of the first decentralized data entry applications – payroll and daily labor reporting and journal entries.

One of these applications is now installed and the other will be installed by year end and will afford Thilmany even further savings in time and improved throughput.

The current thinking is that one day can be completely cut out of the period closing cycle, thereby allowing the executive management more time to analyze and plan for the future.

The main advantages of the new data entry technologies are that they:

- Afford more work with less people in less time, thereby reducing budgets and making the data center more of a tool.
- Free up space that had been needed to store cards (both blank and punched). Thilmany's space savings have been enough to house its seven-man programming staff.
- Make decentralized data entry (in the user location) now entirely feasible.
- Make the cardless data center practical.

System 'Listens' To Service Data

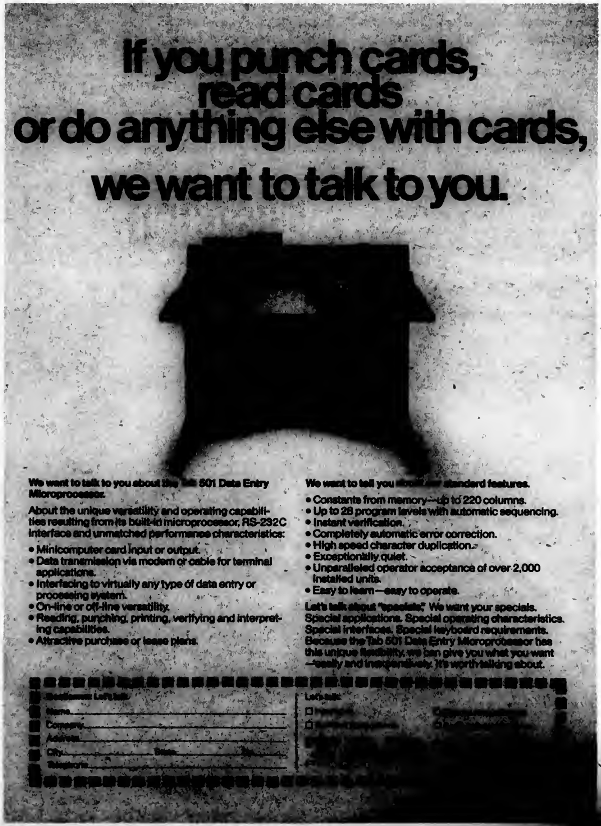
(Continued from Page S/17)

date) to make sure the data is correct.

Voice data entry permits hands-free disposition of the compressors. In addition, the data is now in computer format, and the keypunch department previously required for data entry has been eliminated. Credits due are sent to customers within two days.

Voice has increased the capability and throughput of unit analyzers so their prior two-shift operation has been reduced to less than one shift.

Tecumseh has been able to reduce the customer turnaround to a few days instead of weeks while reducing costs and improving accuracy.



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Bell Transaction II for Users Without Audio-Response Units

NEW YORK – A second member of the Transaction Telephone terminal family has been developed by Bell Telephone Laboratories.

The Transaction II terminal is for use in systems not equipped with audio-response units. It was designed for credit card authorization, check verification and other electronic funds transfer functions.

Transaction II has improved over the earlier version with an eight-character visual display, hands-free operation and the ability to operate both in a voice-only system and in a data-oriented system.

The features are in addition to those of the earlier model Transaction Telephone, which reads American Banking Association magnetic stripe cards, offers data access to a CPU and serves as a regular business telephone.

Terminal Transactions

The display is a seven-segment type with eight digits for showing either locally keyed information or information received through the data receiver.

In addition to numerals, the unit can display some alphabetic characters, depending on the display characteristics and the decoding capabilities of the data receiver. The terminal includes a built-in modem.

Data Receiver

The data receiver was designed to receive control characters and characters for the display. Control characters include those for operating response lamps on the set and other functions, such as disconnecting or retransmitting data.

The data receiver operates at 150-, 110- or 75 bit/sec with frequency-shift keyed (FSK) data. Data rate is selected by a character on the dialing card.

Hands-free operation is accomplished with "on" and "off" buttons, a line control relay and a call progress tone sounder. The on and off buttons initiate and terminate calls, just as the switchhook does in the earlier version.

First tariffs for the Transaction II terminal will be filed by Bell System companies in April 1976. Rates are expected to be in the $25- to $35/mo range, an AT&T spokesman said.

AT&T Transaction II Terminal

AM 'Fraudproofs' Mag Stripe Cards

LOUISVILLE, Ky. – Addressograph Multigraph Corp. (AM) has introduced a development in credit/debit card technology which it said makes magnetic stripe cards "virtually foolproof" against the most serious kinds of card fraud.

The company's Card Security Feature (CSF) affords "a high degree of protection to both card issuers and card-using consumers against counterfeiting, tampering and other forms of card fraud which today result in losses estimated to exceed $300 million per year," an AM source said.

AM's anti-fraud system uses randomly dispensed reflectors embedded beneath the magnetic stripe. When read by an infrared sensor, these reflectors and their position relative to the magnetically encoded data create a "fingerprint" that is said to be unique to each individual card.

A banking terminal's sensors can detect reflector positions variations of less than 1/1,000 of an inch, the spokesman said.

The card's electronic fingerprint is contained in the card issuer's central CPU memory. Only when there is an electronic match can a card complete a transaction.

The CSF is designed to be incorporated into AM's credit/debit cards and its Amcat credit authorization/electronic funds transfer terminals.

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COM perspectives from Kodak:

Understanding the economic impact of a Kodak COM installation.

The most cost-effective approach to COM is a lot easier to find now because of a Kodak service called PRINTCOM. It lets Kodak actually premeasure the savings you can expect, using your own cost figures, when you put a Kodak KOM-80 microfilmer to work in your EDP environment.

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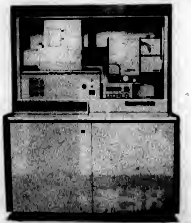


Kodak KOM-80 microfilmer For top throughput speed with high reliability.

Sweda's optical scanner reads UPC symbols regardless of the position of a supermarket item as it passes over the scanner.

Sweda Extends Series 600 POS Line

PINE BROOK, N.J. – The Sweda International division of Litton Industries has added another system to its Series 600 electronic point-of-sale (POS) product line.

Designated the Sweda 600/60, the system is tailored to offer POS automation, store-level data collection, processing and reporting to retailers requiring less extensive reporting capabilities than those provided by Sweda's earlier 600/80 system.

The 600/60 allows price lookup of velocity-coded items from all terminals and provides tabulations, by checker, from all terminals a checker may use. The velocity code provides smaller stores with an alternative to the Universal Product Code (UPC).

Terminal Transactions

Operation of the 600/60 controlled through "English" commands typed on the manager's console. The 600/60 is the only low-priced system available that includes a manager's console, a Sweda spokesman said.

The system provides store management with store-wide summaries, by terminal or checker, which can be obtained from the terminals at any time. The terminal summaries include such data as total sales; number of customers; cash-in-store; tax, food stamp and coupon totals; and productivity data.

In addition, the 600/60 provides item movement reports, daily or weekly storewide summary reports (by department and total for store), a daily or weekly cash report, store balance report, store activity report, a till status report (by operator or cash drawer), a coupon report and an operator balance report.

Uses Floppy Disk

The 600/60 includes the Sweda 600 terminal, 32K minicomputer, the manager's console and a 315K-byte flexible media disk system.

The system, which has a 150 item-price lookup capability and a 50-coupon lookup capability, can accommodate up to eight terminals. Options include a 9- to 16-terminal operation, negative check authorization for 2,000 accounts and communications to a host computer.

The flexibility of the 600/60 allows the system to be upgraded to the earlier 600/80, the firm said. The 600/80 system offers larger disk storage and software required for upgrading to Sweda's UPC scanning system.

The 600/60 system can transmit batched store data on-line to an IBM 360 or 370 or other CPUs using binary synchronous communications. It can transmit at speeds up to 2,400 bit/sec on dial-up or 9,600 bit/sec on private lines.

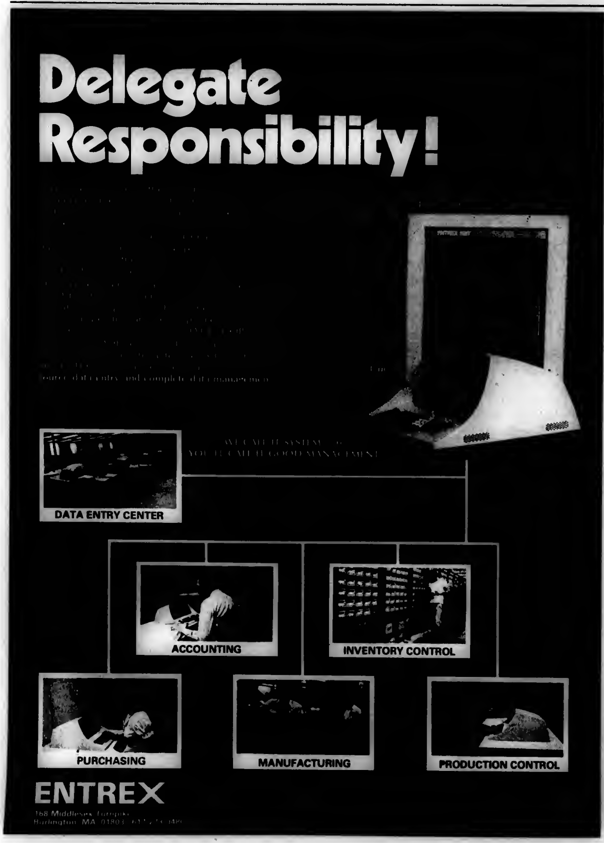
A typical eight-lane version of the 600/60 costs $33,000 for the processor and eight checkout terminals. First deliveries are scheduled for early 1976.

Omnidirectional Scanner

Sweda also introduced an optical scanner for its Series 600/80 supermarket POS system that reads UPC symbols regardless of the position of the products as they pass over the scanner at the checkout counter, the company said.

The fixed-head, omnidirectional scanner is said to be the only unit that will read the UPC symbol whether the bar code pattern is on the bottom, front, back or either side of the package.

The omnidirectional scanner is designed to sell for $3,950 with first deliveries in mid-1976, Sweda said from 34 Maple Ave., 07058.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Bits & Pieces

Grumman Ties IBM 1403s With Burroughs Machines

WOODBURY, N.Y. – Burroughs computer users can link their machines to IBM's 1403 printers with the G1403/Burroughs printer controller from Grumman Data Systems Corp.

The printer controller is plug-compatible with Burroughs computers utilizing a buffered controller to drive a B9240, B9241, B9242, B9243 or B9246 buffered printer.

The Grumman device comes in a standalone enclosure and includes logic cards, memories, mating connectors, power supplies and instructions, Grumman said.

The printer controller costs $17,000 and can be leased for $500/mo including service on a minimum one-year rental. Delivery is 90 days from the firm at 45 Crossways Park Drive, 11797.

Tab Cartridges Ready With Labels

PALO ALTO, Calif. – Tab Products Co. will supply its Easy Load II tape cartridges with Compucolor labels already affixed to match a user's sequential numbering series, the company said.

The user must order the cartridges in lots of at least 500. The labeled cartridges cost about the same as buying cartridges and labels separately from Tab, but save the user considerable labor costs, the vendor said.

Tab will continue to offer Compucolor tape ID labels separately.

Tab is at 2690 Hanover St., 94304.

Diskette Jackets Convert to Pockets

NEW WINDSOR, N.Y. – Standard diskette jackets convert to hanging file pockets in Monarch Metal Products, Inc.'s line of diskette storage units.

Self-stick "hang-its," supplied free with the storage units, attach to either side of the diskette jackets, supporting the diskette in the storage unit.

Monarch's 4126 storage module holds up to 100 diskettes in this way. The company's 4130 transporter holds four diskette modules.

The 4131 diskette storage cabinet has two full suspension roll-out units with a 400-diskette capacity.

Both the diskette transporter and the diskette cabinet come with a roll-up tambour door with lock.

The storage module costs $22; the transporter costs $127.50 and the diskette storage cabinet costs $167.50 from the firm at P.O. Box 4081, 12550.

Datapro Survey Finds

DEC Users Happiest With Mainframes

DELRAN, N.J. – Users of Digital Equipment Corp. large-scale computers expressed a higher degree of overall satisfaction than users of any other make of general-purpose mainframes in a recent Datapro Research Corp. survey.

Burroughs Corp. won the software laurels by earning the highest user ratings for its operating systems and compilers.

Based upon a questionnaire mailed to 8,200 Datapro subscribers in June, the survey attracted 2,041 responses representing users' experience with a total of 2,381 general-purpose computers.

The survey respondents were asked to assign ratings of excellent, good, fair or poor to 12 distinct aspects of their computer equipment and the associated software and vendor aupport. Then, by assigning a weight of 4 to each user rating of excellent, 3 to good, 2 to fair and 1 to poor, Datapro calculated a "weighted average" rating for each category.

In the overall satisfaction category, the eight major computer manufacturers earned these weighted average user ratings: DEC, 3.4; Xerox, 3.3; IBM, 3.2; Burroughs and NCR, 3.1; Univac, 3.0; and Control Data Corp. and Honeywell 2.9.

The top-rated companies in each of the other rating categories were as follows: reliability of mainframes, Xerox; reliability of peripherals, IBM; responsiveness of maintenance service, DEC; effectiveness of maintenance service, DEC and IBM; and technical support, Xerox.

Burroughs led for operating systems and assemblers and compilers, Xerox for applications programs, DEC for ease of programming and ease of conversion and Burroughs for ease of operation.

The category that received the highest overall user ratings was reliability of mainframes, while technical support and applications programs were judged to be the weakest areas for nearly all of the vendors.

Ironically, Xerox, which was rated tops in all three of these categores by its users, announced its withdrawal from the general-purpose computer business shortly after the survey was conducted.

IBM products were rated slightly above the overall industry averages in four categories (reliability of peripherals, effectiveness of maintenance service, technical support and overall satisfaction) and essentially equaled the industry averages in all of the eight remaining categories.

IBM computers accounted for 1,448, or 71%, of the 2,041 user responses, while sample sizes for the other vendors ranged from 163 responses for Honeywell to 25 responses for both DEC and Xerox.

The Datapro report, "User Ratings of General-Purpose Computer Systems," contains the individual ratings earned in each category by some 60 computer systems. Additional tables analyze the responding users' methods of acquisition, principal applications, sources of applications programs, usage of remote terminals, and usage of "foreign" (plug-compatible) peripheral equipment.

The complete survey results are available in an eight-page report priced at $10, Datapro said from 1805 Underwood Blvd., 08075.

Inforex's Smallest Key-to Disk Serves Up to Four Keystations

BURLINGTON, Mass. – Inforex, Inc. has introduced its smallest key-to-disk system – with a maximum of four keystations – aimed at replacing clusters of keypunches or stand-alone data entry devices.

Called the Model 1300, the system is nonprogrammable, but the user can format records, print from either disk or tape, capture totals and do some limited editing, an Inforex spokesman said.

The Model 1300 offers both binary synchronous communications and Inforex's Infosync synchronous communications feature which permits communications between the 1300 and other Inforex key-to-disk systems.

Data transfer can take place from either tape or disk, and communications can be controlled from either a keystation or a remote terminal.

Communications and data entry/verification can go on concurrently, as can printing and key entry.

The processing capabilities of the system are said to be similar to those in Inforex's other Series 1300 data entry systems and include reformatting, cascading program levels, self-balancing, left-zero insertion, right boundary checking, in-context editing and automatic field correction.

A typical four-station Model 1300 consists of a control unit, a 5,000 record disk drive, an 800 bit/in. tape drive and four CRT stations.

Both serial and line printers are available for the system. Printer speeds range from 30 char./sec to 400 line/min. Card reader speed is 300 card/min.

The system is available for purchase and on three- or five-year leases. A typical four-station system costs $683/mo, including maintenance.

Delivery is 60 days from the firm at 21 North Ave., 01803.

Net Responds 10 Times Faster After 370 Gets Memory Boost

SAN FRANCISCO – The installation of semiconductor add-on memory on an IBM 370/158 here has brought a tenfold improvement in the average response time of a large CRT terminal network.

The 158 is one of two such machines in a major government DP center. The 158 with the add-on semiconductor memory handles two on-line, real-time communications networks which provide on-line inquiry and update capabilities to 14 criminal justice users and a 500-bed teaching hospital.

The 158 runs under VS/2. During peak periods, the paging rate previously ran between 40- and 60 page/sec, which produced a 45- to 70 sec response time on the terminals, according to Thomas Johnson, the center's assistant director.

The center decided the 158 had the "horsepower" necessary to handle transactions once the data was brought into real memory, Johnson explained. So the center started looking for additional memory for the 1M-byte system.

IBM came to mind as a source, but the mainframer would not lease add-on memory for the center's 158 because it was a purchased machine, Johnson said.

The center then sent out a 33-page questionnaire to five vendors and, "based on their responses to service, hardware capabilities and cost questions, we selected Intel's In-7158," Johnson said.

The major reasons for the choice were "the financial stability and overall know-how of Intel and the fact that it services its own equipment."

Installed on the real-time system in eight hours on a Saturday in July, the additional 512K reduced average terminal response time from 37.5 sec to 3.5 sec,, Johnson said.

So far reliability has been "very good," he said. The add-on memory leases with maintenance for $2,350/mo.

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RAYTHEON

To Get Money's Worth

Users Must Realize Potential of DP-Aided Data Entry

By Kim Kahn
Special to Computerworld

Many users who have gone from keypunch input to key-to-tape, key-to-disk and on-line data entry systems have managed to save money, but are not getting the most out of their new machines.

The problem is they still consider these systems as data entry systems, not data preparation systems that can be an integrated part of a user's total DP capability.

Too many companies still regard their key-entry department as a clerical group that puts data into the computer for control clerks to balance or correct at a later time.

The main computer still runs the same long edit and balance routines left over from keypunch days. The 80-column card image is still the basic input record.

Although key-to-disk units are driven by a computer, the tendency is still to consider key entry as only that – key entry. Thus, an important fact is overlooked, i.e., that these systems are in fact computer systems, on-line time-sharing systems to be more precise, dedicated to the purpose of generating accurate and useful data.

A Matter of Training

Optimizing any new technique is a matter of training. When a company purchases new mainframes, all operations and key software people are immediately trained on the new system. On the other hand, the arrival of sophisticated key-entry equipment normally brings training only for people actually involved with key-entry. Even for these people, the training on key-to-disk equipment is primarily focused on actual entry and not on systems training. This segregates data entry and mainframe tasks.

Efficient data preparation dictates the proper balance of all data processing tasks. This balance can be accomplished by cross-training in the key cost areas of data processing (entry, operations, edit/control) and, most important, education of development personnel in the full processing capabilities of data preparation systems. Systems development personnel, for example, must be trained to think in terms of the total process of data preparation. They can then recognize the strengths and limitations of each element within their total DP system.

Once the firm starts to utilize the real processing potential of computer-assisted data entry systems, it can balance the tasks assigned to each part of its DP systems and so eliminate such redundant activities as repetitive edit and balance routines.

Key-to-disk data entry should be designed to solve data capture problems and to conform to the nature of the source document.

Key-to-disk systems today offer not only keypunch replacement benefits (elimination of cards, CRT prompting, batch control, simple editing and totaling), but also editing and validating capabilities, along with data control features.

The Entrex equipment I have used and other key-to-disk gear can provide editing in an interactive mode between the system and the operator, but also offer additional editing and validating in a background partition.

Some computer-assisted data entry systems can provide the full integration of all DP tasks with little or no long-range reprogramming or system redevelopment efforts. Specific key-to-disk features which facilitate integration include the following:

- Processing power capable of all input/output, verification, editing, validation, control and reformatting functions.
- Background processing including the capability to perform calculations upon data, sort and merge operations, data communication and selective output of data (i.e., all standard computer functions).
- File management capability via standard software, providing file inquiry and data base management functions.
- Standard communication software providing a range of options, protocols and bit/sec rates.
- Standard software with Cobol-like language, providing the user with the ability to tailor the system to his requirements.
- Easy program generation through interactive program development and macro-type verbs in the programming language.
- Minimal mainframe reprogramming provided by comprehensive data reformatting routines which convert data from source document format to mainframe format.

Kahn is president of Scientific Business Systems, Inc., Willow Grove, Pa.

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A FULLY PROGRAMMABLE, MULTI-USER SYSTEM
DATASHARE is a fully programmable, multi-user system using a powerful processor and a line of peripherals to match your needs. Using the Datapoint 5500 processor with 48K user memory, 16 users can simultaneously access the system and accomplish data entry, data processing, file management or report generation. Programming can be quickly accomplished in DATASHARE language. Each user can run a separate program and access single or multiple public or restricted files. There's no spinning wheels trying to make a limited system fit specialized needs – DATASHARE's inherent flexibility and powerful software lets the user at each remote site readily accomplish the task at hand.

WITH VIRTUAL MEMORY
Optimum productivity from any computer system requires an Operating System that allows user programs to exceed the main memory size. Most large mainframe systems today use virtual memory techniques, and so does DATASHARE. Up to 512 K characters (bytes) of space may be shared among the maximum 16 DATASHARE users such that each user is assured a 32K program space.

DYNAMIC FILE MANAGEMENT
Any business processing system worth its salt needs a file structure that users can work *with* easily, not have to work *around* arduously. The files generated on the DATASHARE system are totally dynamic – which means that users can easily create new files without regard to file length or use of complex file tables. Also, files can be combined, added to or deleted without complex techniques or system considerations. And DATASHARE files are compatible with other Datapoint programs such as DATAFORM, DATABUS, BASIC, RPG 2, etc. There's no need for tedious time consuming file conversion routines to use DATASHARE files in other applications or with other non-DATASHARE Programs.

EASY FILE BACK-UP
Many competitive systems are oblivious of the real business need for keeping duplicate files, offering only relatively primitive capability for file duplication or back-up. DATASHARE's Operating System allows a convenient means to duplicate entire disk files and utilities for cassette-disk, tape-disk or disk-disk duplication procedures, allowing crucial back-up files to be easily made.

CONCURRENT COMMUNICATIONS/PROCESSING
Datapoint processors have long been noted for their powerful communications packages, whereby program and data files can quickly be transferred between processor sites. Similarly DATASHARE now offers the ability to transmit and receive data files while the field system users continue using DATASHARE for standard applications. Files may now be sent to a central home office or other computer site without any interruption to normal ongoing usage.

Likewise, as with any computer system, there's a need to create new programs, to debug, to run utilities or other batch operations. With DATASHARE's concurrent processing capability the system manager can do all these, can run RPG 2, BASIC or DOS Utilities from the central processor console while the system's terminal users still enjoy full access. With this capability, new system development, or "odd jobs" don't have to wait for off-hours.

REMOTE OR LOCAL USER TERMINALS
DATASHARE user terminals can be placed up to 2,000 feet away from a central 2200 or 5500 processor using simple twisted pair connections. But if there's a need to go further, the terminals can be hooked to modems or acoustic couplers and standard dial-up telephone lines using conventional hardware. In fact you can cross the country with a DATASHARE network. And you can have one or more DATASHARE ports used as a dial-up facility sequentially accessed by an unlimited number of field users. To make field office usage even simpler, all DATASHARE hardware and software is operator-oriented with a minimum of controls. The 3600 user-terminal, for example, has a straightforward typewriter style keyboard and easy to read non-glare display.

PROGRAM FLEXIBILITY
Thousands of DATASHARE installations in field locations have demonstrated the flexibility and cost effectiveness that a proven system can provide. But there's another important advantage to DATASHARE usage – program interchange. Programs written for your DATASHARE can also be used in the popular Diskette 1100 Intelligent Terminals. With this capability, programs need not be restricted only to DATASHARE sites but can be used for those applications whenever a single-user stand-alone system such as a Diskette 1100 is utilized. Also, programs written for the Diskette 1100 will run in the multi-user DATASHARE system.

ADAPTABILITY – DATASHARE'S MIDDLE NAME
Another nice thing about DATASHARE is its ready adaptability to your company's needs and requirements. In some organizations, it may serve as an independent computer utility, providing computer power for a multitude of applications to its work stations. In others, the user terminals may serve strictly for data entry, editing and pre-processing of field data so that a large central computer can function most efficiently. For some users, the powerful independent processing at dispersed work stations is the attraction. For others, it's the ability to structure very tightly a computerized approach for previously manually handled chores. Or it can be a combination of all of the above. Adaptability – DATASHARE's middle name and another good reason why it's the best yet.

So don't settle for second best. Go with the most advanced, most proven dispersed processing network on the market – DATASHARE. For more information, contact the Datapoint sales office nearest you, or write or call Datapoint Corporation, attention: Marketing Communications, 9725 Datapoint Drive, San Antonio, Texas 78284 (512) 690-7151.

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Switch to Key-to-Disk Lowers Wage/Operator for Firm

By Beverly Ross
Special to Computerworld

When American Computer Tax, Inc. (ACT) switched from keypunch to key-to-disk data entry, it found it could hire less experienced and, thereby, less expensive help for its busy season.

ACT is a Lakewood, Colo., firm that processes tax returns and accounting data for professional accounting firms and attorneys in seven states.

Since it is impossible to find any two tax returns where all items are repeated, the data entry system and the editing process must be highly refined.

When ACT replaced keypunch machines with a key-to-disk data entry system, it hoped to:

- Double productivity/operator.
- Utilize inexperienced and untrained data entry operators.
- Reduce entry error rate.
- Reduce data entry costs through elimination of the need for numeric verification.

All of the above has been accomplished since the October 1974 installation of a Univac 1900 key-to-disk system.

50,000 Returns Processed

ACT processed 40,000 to 50,000 tax returns annually with the major portion processed from Jan. 1 through April 15. The throughput capabilities of the 1900 system are such a significant improvement over keypunches that we now require half the number of machines and operators previously required.

Furthermore, the average wage per operator is less than we would have to pay keypunch operators. This is due to the self-training capabilities of this data entry system and its capability to edit input, thereby eliminating operator decisions.

ACT hires as many as 30 additional operators during the peak season.

New operators get used to the system with a hands-on training program supplied by Univac, and this training program is then supplemented by programmed instruction and testing on ACT's own input formats.

Upon completion of a training program, the length of which is two to 10 days depending on machine background and experience of the trainee, the operator is able to key live data.

Machine Detects Errors

The machine itself is programmed to detect all kinds of errors. When it detects one, it will not allow the operator to continue until the error has been properly handled.

Our clients must be confident that the service provided them is accurate in output and has been processed from error-free input. We must also ensure rapid turnaround time.

The 1900 system helps ensure that if the input information is incomplete and/or incorrect, the data entry operator is alerted by the system prior to entry. The error can then be referred to the preparer and corrected prior to actual processing. Key entry error is also eliminated in the same manner.

Less Time, Money

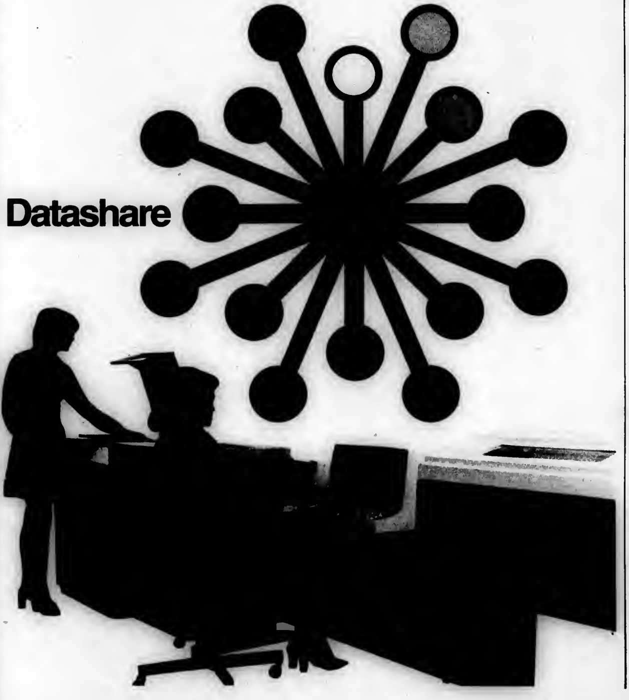
All of the above results in less time and money going to mainframe edits and processing and helps ACT provide its clients with less expense, faster service and the confidence that the material is as accurate as possible.

Studies by our company have revealed that detection of errors at the time of entry has eliminated 98% of the error rate (including user-created errors) experienced in the past when using keypunch machines. The only errors left for the mainframe to check are those detected by "reasonability" limitations and caused by inaccurate input.

The 1900 hardware costs more than keypunches. However, comparison of wage costs between the key-to-disk system and a keypunch system reveals the time-saving advantages of the key-to-disk system over the keypunch system makes up by far for the extra hardware costs.

Cost comparisons between our keypunch and new key-to-disk system have revealed that overall data entry costs for one Jan. 1 to April 15 peak period are a third lower.

Ross is vice-president of American Computer Tax, Inc.



Bulk Tape Eraser Works in 5 Sec

WALTHAM, Mass. – The Kybe-Weircliffe Model 8 bulk tape eraser can completely erase a 14-in. magnetic tape reel in 5 sec, according to Kybe Corp., which is marketing the device.

The bulk tape eraser, designed by Weircliffe of Exeter, England, has no moving parts, Kybe said.

The user simply presses a button on top of the eraser's cabinet, inserts the tape as the cabinet's door opens and removes the tape seconds later when a light signals the tape has been erased, Kybe explained.

Another Kybe-Weircliffe tape eraser, the Model 30, is designed to erase Philips-type cassettes.

The Model 8 costs $995 and the Model 30 $125 from Kybe at 132 Calvary St., 02154.

Ansi OKs Standard To Put Uniform Data On Microfilm Labels

SILVER SPRING, Md. – The American National Standards Institute (Ansi) has accepted the National Microfilm Association's (NMA) industry standard for microfilm package labeling.

Ansi made one major change before accepting the standard. What were once suggested storage conditions and film winding instructions are now a required part of the label information.

The purpose of the standard is to ensure uniform information is clearly placed on all labels for the packaging of photographic materials, including microfilm in roll, sheet and card formats.

The standard, PH5.19-1975, is available from NMA, Publication Sales, 8728 Colesville Road, 20910 at $1.50 to NMA members and $2 to nonmembers.

COM Course Offered

SILVER SPRING, Md. – The Computer Image Processing Division of the National Microfilm Association (NMA) has chosen the meeting sites and dates for six educational seminars beginning in January and continuing, one a month, through June.

The course will stress the value of computer-output microfilm (COM) as an integral part of various information systems, NMA said.

The seminars will be held Jan. 13-14 at Stouffers National Center Inn in Washington, D.C.; Feb. 17-18 at the Hilton-Airport in San Francisco; March 22-23 at the O'Hare Hyatt in Chicago; April 7-8 at Barbizon Plaza in New York City; May 25-26 at Peachtree Center Plaza in Atlanta and June 29-30 at the Le Baron in Dallas.

The two-day seminars cost $100 from the NMA at 8728 Colesville Road, 20910.

Two IBM Instrument Systems Combine Spectrophotometry, DP

HARRISON, N.Y. – IBM has introduced two integrated instrument systems which combine spectrophotometry with digital computer processing and output their data onto floppy disks.

Called the IBM 7840 Film Thickness Analyzer and the IBM 7841 Textile Color Analyzer, the systems are intended for use in the semiconductor and textile industries.

The Film Thickness Analyzer may be used to measure specific semiconductor film thicknesses ranging from 300- to 55,000 angstroms, IBM said.

The Textile Color Analyzer can be used in a variety of applications ranging from color matching and calculating dyestuff quantities added during production to determining color values and shade sorting.

Selected measurement results can be displayed immediately, printed and stored for future recall. In addition, specific data may be transferred through the diskette to a computer for further analysis or entry into a product historical data base, IBM said.

First customer shipments of the systems are scheduled for January. The 7840 costs $85,000 and the 7841 is priced at $80,000 from the firm's Systems Products Division, Integrated Instrument Systems, 600 Mamaroneck Ave., 10528.

Air Conditioner Has Precision Readout

COLUMBUS, Ohio – The Deluxe System/2 air-conditioning units from Liebert Corp. have a Precision Control Readout (PCR-2) designed to give computer operators data on the operation of the System/2 and on environmental conditions in the computer room, as well as control over the system.

The standard panel is composed of a start button, which also serves as a push-to-test system for the malfunction indicator lights. It is also used as a manual reset button.

A red stop button shuts off the system and also indicates temporary loss of power or low voltage. A white silencer button quiets the alarm when a malfunction occurs. The indicator lights stay on until the indicated problem is remedied.

And the PCR-2 display panel indicates cooling, reheat, humidification, dehumidification and dirty or clogged filters.

It also registers high head pressure in the compressors, loss of air flow, high or low room temperature and high or low room humidity when the optional Mode-Alert is specified.

There is an area on the panel for special alarm systems a customer may require.

Liebert is at 1050 Dearborn Drive, P.O. Box 29186, 43229.

Get Any Vibes?

What are these men doing? The one with the hammer is tapping the phase leads that conduct power out of a Westinghouse 870M volt ampere generator. The other man is watching a frequency analysis of the vibrations on a Hewlett-Packard Fast Fourier analyzer.

If the natural frequencies of the phase leads turn out to be too similar to the frequencies produced in power generation, "sympathetic vibrations" could shorten the life of the phase leads.

Westinghouse said thorough harmonic testing of generator elements now takes one day compared with five days for conventional methods.

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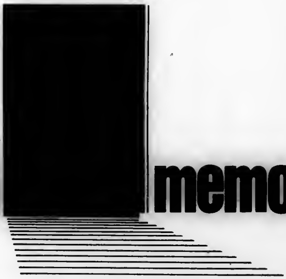

370/145 memory

Four Firms' Systems Debut

Products Coming Fast and Furious From Many Sources

Minicomputer announcements have been coming fast and furious during the past few weeks, both from the traditional minicomputer makers and other disparate sources.

Last week there were four such announcements: A slight reconfiguration from the industry leader, Digital Equipment Corp.; a line of systems from component maker Texas Instruments (TI); and the announcement of mini systems by two terminal firms – Tektronix, Inc. and Anderson Jacobson, Inc.

TI Line Mixes Micros, Minis

TI jumped back into the minicomputer business with a compatible line that mixes microprocessors and full mini systems.

The family of digital processors includes the TMS 9900 microprocessor, the Model 990/4 microcomputer and the Model 990/10 minicomputer. Also included are software development systems, cross support on time-sharing networks and a prototyping system.

The TMS 9900 is a one-chip, 16-bit microprocessor using MOS N-channel silicon-gate technology.

The 990/4, a complete microcomputer on a single printed circuit board, uses the TMS 9900 as its central processor and the general-purpose 990/10 minicomputer is a TTL implementation of the 990 architecture to provide higher performance speeds.

The 990/4 and 990/10 computers are available in several chassis configurations: an OEM package, a 7 in. (6-slot) or 12-1/4 in. (13-slot) rack-mountable chassis or a tabletop enclosure. A programmer's front panel console is available for both chassis.

Cross support is available for users to develop applications programs for the 990/9900 family. It consists of assembler, linking loader and simulator on National CSS, Tymshare and GE time-sharing networks.

Software Systems

In addition, two stand-alone software development systems were announced. One consists of a 990/4 microcomputer with 16K bytes of memory, a software development package and a TI Silent 700 ASR data terminal.

The second stand-alone system is disk-based and includes a 990/10 minicomputer with 64K bytes of memory, up to four 2.2M-byte disks, a TI Silent 700 ASR terminal, a TI Model 913 video display terminal, a DX10 software development package and optional line printers and card readers.

A prototyping system to permit TMS 9900 microprocessor users to develop custom software and firmware modules is also available. This system consists of a 990/4 microcomputer with 16K bytes of memory, a Silent 700 ASR terminal and an optional programmable read-only memory (Prom) programming kit.

Since all models in the computer line use the instruction set of the TMS 9900 microprocessor, software developed for the low-end computers will be compatible with the higher performance models, TI said.

Bit, byte and word addressing of memory and I/O interfaces is standard in each 990 model. This facilitates data collection and transfer to remote locations and is an advantage to OEMs and end users who have distributed data bases, data communications networks or manufacturing automation environments, according to TI.

An asynchronous 16-bit parallel I/O data bus (Tiline), links the CPU, memory and peripheral devices.

Because the bus is asynchronous, it can support high-speed memory as well as slower memory, minimizing sychronization problems found with synchronous DMA channels.

Other features include a 120-Hz. real-time clock input, vectored interrupts and hardware multiply and divide.

The 990/4 has memory expansion to 58K bytes, and the 990/10 has memory mapping feature that provides memory protection and privileged instructions and supports memory expansion to 1M bytes, both of which are available options.

The 990 computer family is supported by a library of software development packages, including disk and nondisk operating systems, utilities and Basic, Cobol and Fortran compilers.

The 990/4 microcomputer is priced at $368 with 512 bytes of memory and at $512 with 8K bytes of memory. The 990/4 microcomputer with a 6-slot chassis, power supply, programmer's panel and 8K bytes of memory is priced at $1,216.

Add-on memory for both computers is available up to 40K bytes on a single printed circuit board in 8K-byte increments. The price for a 40K-byte memory board is $1,600.

The 990/10 minicomputer, with 16K bytes of memory, chassis, power supply and programmer's panel, is $1,968. Deliveries of the microprocessor, the computers, the software development systems and the prototyping systems are scheduled to begin in the first quarter, the firm said from P.O. Box 1444, M/S 784, Houston, 77001.

DEC 'Super' System

A parallel processor version of the PDP-8/A that performs fixed- and floating-point computations has been announced by Digital Equipment Corp.

Called the "Super-8," the minicomputer incorporates a second processor to perform all fixed- and floating-point arithmetic operations in hardware. The Super-8 continues to use the conventional PDP-8/A processor for other functions, such as input/output operations and system management.

The Super-8 was designed for OEMs and end users who need fast Fortran IV, floating point and extended-precision arithmetic at reasonable cost, the firm said.

Sample instruction times include 10.5 µsec fixed-point add, 30 µsec floating-point add and 37.5 µsec floating-point multiply, DEC added. It is completely compatible with previous models of the PDP-8 family.

Priced from $5,995 including 8K words of core, the Super-8 is scheduled for delivery in early April.

The Super-8 operates with three data formats: 24-bit fixed point, 24-bit floating point with 12-bit exponent (36 bits) and 60-bit floating point with 12-bit exponent (72 bits) for extended precision arithmetic.

It can run Ansi-compatible Fortran IV under DEC's OS/8 operating system and present PDP-8As can be field-upgraded. Other features of the Super-8 include eight index registers and 64 new instructions. The floating-point processor uses a 15-bit address path, directly addressing 32K words of memory.

Tektronix 'Personal Computer'

The Tektronix 4051 is a "personal computer" that compares with IBM's 5100 in price and performance, but offers an interactive graphics capability besides, a spokesman said.

Both machines have keyboards, displays, function keys, numeric pads and a 3M Co. tape cartridge for mass storage. The Tektronix 4051 offers extended Basic, while the IBM machine supports both Basic and APL.

The 4051 offers a maximum 32K compared with the 64K available on the 5100. Both devices offer asynchronous communications.

The 4051's much larger display (2,250 characters vs. the 5100's 1,024 characters) signifies the major differences between the two machines.

The 4051, Tektronix said, has the graphics capability to produce "very natural pictures, civil engineering maps, financial data and other data" on its display screen.

It is somewhat difficult to place the 4051 among the current types of DP hardware.

With its Motorola 6800 microprocessor, the 4051 can run a Basic program in about the same time as a Digital Equipment Corp. PDP-11/05 can.

It has an output-only RS-232 interface to drive printers, but offers an optional RS-232C I/O interface that can provide on-line, interactive terminal communications at 2,400 bit/sec with a remote mainframe.

Graphics Capability

And then there is the graphics capability, a spokesman said.

The 4051 could serve as a programmable calculator, but it also offers graphics, communications and an IEEE standard general-purpose interface bus that can link it with most testing and measuring equipment now on the market, the spokesman said.

And the 4051 is an alternative for the terminal user because it can serve as both an intelligent terminal and a Basic language and graphics processor, he added. Additionally, the 4051 can appear as any other Tektronix terminal to in-house or commercial time-sharing software, the spokesman said.

Like IBM's 5100, the Tektronix unit offers software packages that emphasize its use as a problem-solving tool. General-purpose graphics, statistics, mathematics and electrical engineering packages are currently available.

Tektronix offers free tutorial software for the new user, plus verification software to make sure the system is functioning correctly.

An 8K 4051 sells for $6,995 or leases at $280/mo on a 36-month lease.

Tektronix is at P.O. Box 500, Beaverton, Ore. 97005.

AJ 140 Has Accounting System

Anderson Jacobson, Inc. (AJ), known in the data communications industry for its acoustic couplers, printer terminals and peripheral equipment, has announced the Model 140 minicomputer system.

The standard system provides 16K bytes of core memory, three cassette drives and a console keyboard/printer.

The system is expandable to include up to 64K bytes of memory, four disk drives (storing 40M data characters), 200 to 600 line/min printers and multiple input stations, either CRTs or keyboard printers.

Communication controllers are available for the Model 140, and the system will accommodate up to eight remote terminals, CRTs or other devices.

Anderson Jacobson will furnish, without charge, all standard software required for general ledger accounting applications (accounts receivable, accounts payable and payroll), the firm said.

The basic system leases for less than $500/mo or $22,500 from the firm at 1065 Morse Ave., Sunnyvale, Calif.

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Spy Film Features DEC Mini System In Supporting Role

MAYNARD, Mass. – A minicomputer system developed by Digital Equipment Corp. is featured prominently in Dino de Laurentis' spy film thriller, "Three Days of the Condor," a Paramount Pictures release.

The system, which is built around a PDP-8/E computer, is shown in the role of a device to scan books printed in foreign languages and provide English translations.

According to the script, the book-reading minicomputer system is employed by the Central Intelligence Agency to help a research team check novels and anthologies of detective stories and espionage to see whether their authors have invented new and unusual "tricks of the trade."

"Three Days of the Condor" stars Robert Redford, Faye Dunaway, Cliff Robertson, Max Von Sydow and John Houseman. Directed by Sydney Pollack and produced by Stanley Schneider, the film concerns a researcher (Redford) who stumbles upon a secret that means the immediate death of his coworkers. By chance, he escapes being killed and must go into hiding to survive.

During his three-day run from danger, he finds the CIA is deeply infiltrated with foreign agents and is forced to track them down by himself, instead of relying upon the agency for help.

The plot gets its love interest when he kidnaps a passing – and naturally beautiful – motorist who ends up, again naturally, falling in love with him and helping with the search for the enemy agents.

With the exception of the device to "read" the books, all hardware for the computer system is standard. The output device is DEC's dot-matrix Decwriter I, the miniature tapes employed for storage of data and programs are Dectapes and the large fast-access storage device is a Decdisk pack.

Peripheral Purchase Plan Said to Cut S/3 Cost 50%

IRVINE, Calif. – Business Systems Technology, Inc. (BST) has added a Peripheral Purchase Plan for its line of plug-compatible core memories, disk drives and line printers for the IBM System 3.

Included in the plan are reduced purchase prices on BST equipment which are said to result in overall savings of up to 50% on the System/3 – from $25,000 to $50,000 off the normal IBM purchase price – and an expanded rental credit policy for BST customers allowing up to 36 months and 40% off base price.

A typical Model 10 user with 24K of memory, two disk drives, a line printer and MFCU will save $36,000 overall buying his peripherals from BST, a BST spokesman said.

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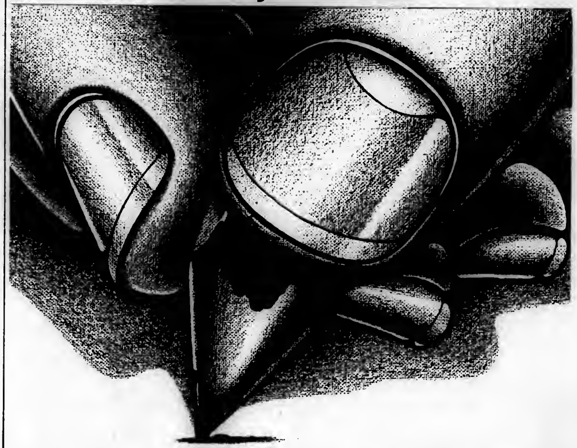

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IBM Scores Another Technological Point With 5100

By Ren Nardoni

Special to Computerworld

The new IBM 5100 portable computer is an amazing piece of equipment (so said IBM, and this user agrees). However, don't run out and put your order in until you have finished this whole review.

I was fortunate enough to have had a demonstration of the 5100 the other day. As one might be able to tell from the specifications, the 5100 is slightly larger than the average portable terminal. In fact, the salesman brought it with him on the subway, put it on my desk, plugged it in (normal circuits), turned it on and the machine was ready to go.

The 5100 comes with either Basic or APL (or both) with a switch on the front panel for selecting the language you wish to use. Being more familiar with Basic, I concentrated on the machine's handling of that language.

The keyboard comes with a command key which, when depressed, converts the alpha keys to Basic verbs. Therefore, to input the verb "Print," the user just depresses the "CMD" key and hits the letter "L" and the word "PRINT" is loaded into the machine. The word "PRINT" is printed on the front of the "L" key.

All the main Basic verbs are represented in this manner, and this user found programming in Basic extremely fast. Additionally, the numeric keys are converted to system commands when used in conjunction with the "CMD" key.

The display screen seemed small, yet when in use the size appeared to be adequate for most functions I was performing. There is a switch on the panel to reverse the screen from white-on-black to black-on-white. The 5100 can also be attached to television monitors for training and presentations. The right-hand bottom corner of the screen indicates usable storage so that the user knows how much is still available.

For flexibility in reviewing program code, the scrolling feature that rolls the display up and down operates very quickly. Format errors in Basic ceuse the screen to flash, and an error message and indicator tell the user where the error occurred.

Analysis

Each Basic line is interpreted at input for instant verification. When executing, the results seemed to appear instantaneously. The machine is fast.

IBM also offers canned software routines (on tape) for mathematical, statistical and business applications. Although the basic 5100 comes with 16K, I don't think you could effectively use these canned routines in less than 32K. Up to 64K is available. The routines cover almost all of the normal functions I would use in financial analysis. The tape unit is fast, but is obviously restricted in speed due to sequential handling. One cannot update part of a file or program without rewriting the entire file to the tape. This would be a restriction to me when updating some medium to large data files.

All of the IBM literature on the 5100 emphasized a machine for "problem solvers," and I agree that for some applications the 5100 would be exciting.

For users requiring large amounts of data manipulation, the stand-alone machine would have obvious drawbacks. However, the user with repetitive functions or with functions independent of outside data bases and software could possibly use the 5100 to replace some commercial time-sharing applications.

Also, the telecommunications option with the 5100 would enable a user to do both data analysis and repetitive functions. Using the 5100 as a terminal to extract data from external data bases onto the tape, the user could then revert the 5100 to a stand-alone machine to do analysis and/or report generating.

The 5100 is available by purchase only, and the price can range from approximately $9,000 to $27,000, depending on options. Considering normal depreciation rates, a potential purchaser may realize additional savings. The price tag seems reasonable, considering IBM equaled the 5100's power to that of the 360/30.

This user's opinion as to the impact of the 5100 on the time-sharing industry is that the industry will know IBM is there. The industry may lose some of the big number crunchers and calculator-type users.

However, some positive benefit may be felt by commercial time-sharing companies from the user who runs the IBM 5100 as both a terminal and as a stand-alone computer and who requires on-line data base support.

The 5100 has options I did not see or use (the impact printer and telecommunications options, for example).

More importantly, my views on potential uses and impacts on the time-sharing industry were based on the functions I perform at AT&T. Each user would need to look at his own operation to see the applicability and benefits of the 5100.

However, from a technology and state-of-the-art viewpoint, IBM has scored another impressive point.

This evaluation is reprinted, with thanks, from the Atsu Forum, *published by the Association of Time-Sharing Users, 210 Fifth Ave., N.Y., N.Y. 10010. Nardoni is supervisor of the financial analysis group at AT&T.*

Shugart Adds Floppy System Kit

SUNNYVALE, Calif. – Shugart Associates has introduced a kit approach for OEMs who want to include floppy disk storage in minicomputer or microprocessor systems.

The SA 8800 Streaker kit consists of a single 12.5 in. by 17.5 in. disk controller and from one to three diskette drives in optional single or double density depending on storage requirements.

The Streaker kit is for OEMs who wish to include their own "value-added" features. They can, at their option, add their own cabinet, standard power supply and interface.

Or, if they wish, they can purchase a standard Shugart SA 3800 diskette storage subsystem and edd additional drives in increments of one, two or three in a single cabinet. The 3800 contains from one to three double- or single-density drives, the controller board and power supply in one package.

The Streaker controller board handles up to six drives in the IBM 3740 format (3.2M bit/drive) or in the double-density format (6.4M bit/drive).

The Streaker diskette drives are Shugart's standard SA800 model. OEM prices for the SA8800 in quantities of 50 with one drive in single density begin at $1,110. For double-density option, add $180, the firm said from 435 Indio Way, 94086.

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Key Mainframers Describe IBM Impact on Industry

• Norris: CDC Switched Emphasis to Services

By Nancy French
And Edith Holmea
Of the CW Staff

NEW YORK – Honeywell Information Systems (HIS) prices are based on IBM's pricing lead rather than those of nonsystems manufacturers or other mainframe makers, Clarence W. Spangle said in court here recently. .

Testifying at the government antitrust trial against IBM, Spangle, HIS president and executive vice-president of Honeywell, Inc., described "the other computer company's" history of pricing starting with IBM's decision to unbundle.

In 1969, when IBM announced its decision to price hardware, software, training, programming support and other services separately, HIS conducted a study of the effect this decision would have on IBM and on its competitors, Spangle said.

Unbundles With Series 60

Based on that study, HIS opted to continue to offer a system for a single price and actually did not unbundle until it introduced its Series 60 in 1974.

The company was concerned customers who had contracted for a system that included such services would be shortchanged, he said.

Although management realized HIS would have to unbundle eventually, "we expected customers to resist the end of bundled services," and "we hoped to gain some market advantage before making the pricing change," he explained.

Even though IBM offered its customers a reduction in monthly rentals of about 3%, that could only be viewed as a price increase because of the cost of software, he said.

Follows IBM Pattern

When it introduced the Series 60, Honeywell felt unbundling was the best way for it to handle supplies and services because its basic pricing policy was to follow that of IBM.

The firm also believed customers who really wanted services such as training and programming support would be willing to pay for them, Spangle said. .

However, maintenance prices were not separated from the overall rental prices on HIS equipment, he said. Overall, HIS prices in the area of maintenance are somewhat higher than IBM's for purchased equipment because IBM has a greater density of installations that allows for economies of scale.

The long-run disadvantages of bundled prices, Spangle said, was the cost of providing users inflation-proof prices and the tendency to let technological improvements in hardware and software fall by the wayside.

IBM decided to unbundle because it felt its large customers wanted to provide their own services and because of pressure from leasing companies as well as software and peripherals companies, Spangle said.

Bundled prices were a central aspect of the Justice Department's complaint against IBM, he said.

HIS saw unbundling as a means for IBM to increase its revenues and become a more effective competitor in the service industries, Spangle said. HIS also believed IBM would lose some of its market share as a result of separating prices, he said.

Competition From Independents

Counsel for IBM dwelt primarily on Honeywell's pricing of the Series 60 in an attempt to show that price reductions on peripherals for Series 60 mainframes were a result of competition from independent peripherals manufacturers rather than of competition from IBM.

IBM attorneys used HIS planning documents for peripherals pricing strategy that showed Honeywell considered tape drive makers, minicomputer manufacturers and the like in its pricing decision.

But Spangle said over and over again this was not the case.

In his discussion of industry standards, Spangle noted those for high-level languages and for formatting information on various kinds of input media were generally set by the American National Standards Institute.

However, he said there are also de facto standards set by the use of IBM equipment. In particular, these concern the transferability of data and information.

• Spangle: IBM Pricing Guides Competitors

By Edith Holmes
Of the CW Staff

NEW YORK – If you can't fight 'em and you don't want to join 'em, make some other aspect of the industry the major thrust of your business.

Control Data Corp. did just that when it decided to emphasize data services, William C. Norris told the U.S. District Court here in the government's antitrust suit against IBM.

Having been "clobbered" by IBM on two occasions – once when CDC introduced its 1604 and again with the advent of its 6600, Norris, the chairman of CDC's board and its chief executive officer, said he couldn't stand by and permit that to happen to his company a third time.

Today, CDC's business is roughly divided into thirds: one-third data services, one-third systems manufacturing and the last third peripherals manufacturing. However, "we consider computer manufacture and marketing an enterprise supporting data services," he explained.

The reasons for this shift from systems manufacturing to data services were competition from IBM, Norris said. In the case of the 1604, CDC was not as successful as it had hoped to be, and the company had to terminate its program sooner than it would have liked.

While he added there was also some competition from Univac and Philco, Norris said IBM's 7040 and 7044 were the 1604's chief competitors. It was between nine and 11 months before CDC obtained an order for a 1604 after IBM's introduction of these machines, he said.

Norris recalled similar competition between CDC's 6600 and IBM's 360 line. That competitive situation forced CDC to lower the price of its 6600 and to announce the introduction of a more powerful machine – the 6800.

The effect of these two competitive clashes was not only a lawsuit brought by CDC on antitrust grounds against IBM, but also a change in the nature of CDC's approach to the marketplace, Norris said.

After eliciting testimony from Norris concerning the company's most profitable products and learning that the 6600 had indeed been the most profitable –

(Continued on Page 36)

Oelman: NCR Lost Money Until '74

By a CW Staff Writer

NEW YORK – Testifying as a witness for the government in its antitrust case against IBM here, a former chairman of NCR startled government attorneys when he described the computer industry as "very dynamic" with "new competitors entering the field across the board every day."

While NCR's Robert S. Oelman did say there were many competitors, he did not comment on how profitable they were. Only since 1973 or 1974 did NCR begin to operate at a profit, he said.

Oelman, who retired in 1974, described the computer marketplace as "lease-oriented" and said NCR had put $700 million into this approach.

Ninety-five percent of NCR's equipment is installed on lease, he said, largely because a manutacturer that wants to stay competitive has little choice other than to offer leases.

NCR's share of the market now is 7% to 8%, Oelman said, based on figures from International Data Corp.

IBM, in contrast, holds 60% to 70% of the systems market, with all others competing for the rest and attaining between 3% and 8%, he said.

As a result of its recent reorganization along the lines of industry applications, Oelman said NCR salesmen who previously were limited to particular products now may sell an entire line of products needed in certain types of applications such as retail department stores or supermarkets.

Ansi Unit Backs IBM Interface

WASHINGTON, D.C. – IBM's 360/370 input/output interface design has received another boost from the American National Standards Institute (Ansi) subcommittee on I/O devices in the lengthy process of becoming the designated U.S. I/O stsndard.

The subcommittee, X3T9, recommended the IBM document detailing the interface design be used as a basis for a proposed standard and discarded an alternate Japanese proposal, according to Delbert L. Shoemaker, chairman of the I/O devices subcommittee and chief of the standards branch in the General Services Administration's Automated Data and Telecommunications Service.

The next step is for the subcommittee to review the document, comment on it and probably put it out on letter ballot after its next meeting the week of Dec. 5.

The subcommittee will then determine whether to submit the matter to Ansi X3 as a proposed standard, he said.

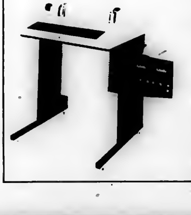
The proposal needs a two-thirds majority approval by letter ballot from about 15 individual members on the subcommittee, Shoemaker said.

The Ansi and X3 procedures for processing a standard require that the subcommittee get the proposal technically to a point where it feels it should be taken to X3 for a vote, he said.

Allowing time for the mail vote, conceivably the proposal could be sent to X3 in February or March, he said.

Jack Biddle, director of the Computer Industry Association (CIA), said his organization of independent computer companies "heartily endorses" the Ansi action.

"An I/O standard is long overdue," he said. "The IBM 370 is the worldwide de facto standard, and it's about time we adopted it formally," he said.



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Core Sues Centronics for Monopoly

By a CW Staff Writer

NEW YORK – Core-Computer Related Equipment Ltd. of England, former distributor for Centronics Data Computer Corp., has filed an antitrust suit against Centronics in the latest round of dispute between the two firms.

Centronics termed both this action and the previous suit filed by Core against it as "spurious and without merit," calling them delaying tactics to prevent Centronics from collecting the $1.8 million owed for goods delivered.

Broke Contracts

The latest suit, filed in federal court here, alleged Centronics attempted to monopolize trade in printers; required Core to agree to unreasonable restrictions as a distributor; broke contracts; and tried to put Core out of business, among other charges.

This action followed a suit filed by Core in July in New York Supreme State Court that sought $10 million in compensation and damages from Centronics [CW, July 30].

Centronics said that suit was voluntarily withdrawn by Core in August, shortly before a hearing was scheduled on its motion for summary dismissal.

The July suit was a "diversionary, delaying tactic to prevent the liquidation proceedings instituted by Centronics to assist in the collection of the $1.8 million" owed it, the New Hampshire-based printer firm said.

Centronics said it is proceeding with its action for the liquidation of the assets of Core in Great Britain.

The firm has instituted a direct sales program in Britain.

Telefile to Go Ahead With Plan To Acquire Xerox Lease Base

By Nancy French
Of the CW Staff

IRVINE, Calif. – Honeywell, Inc.'s assuming responsibility for servicing and marketing Xerox's computers will not affect Telefile Computer Products, Inc.'s decision to add as many Xerox users as possible to its lease base [CW, Oct. 22], S.V. Edens, Telefile president, said in an interview here last week.

"It won't really have any impact on what we're doing at all because we were already turned off by Xerox when we made our decision to work through the users," he said.

Edens will sell his plan to users at a series of meetings in the U.S. and overseas.

The first such meeting is scheduled for Nov. 3 in Los Angeles, followed by another Nov. 5 in Detroit, a third in Philadelphia on Nov. 7 and a fourth in London on Nov. 10.

"We're offering support, new peripheral equipment, core memory and maintenance – the same kind of thing that was apparently set up with Honeywell," he said.

Although Edens maintained the agreement will not affect Telefile in the relative short term, he said he doesn't know what effect it might have in the long run. "I do think right now some customers are going to sit back and say 'I've got to wait and see what's going to happen with Honeywell,' so we'll lose some orders that we would have picked up in the next few months," he said.

Eden's objective is to keep the Xerox product line alive as long as possible, he said, and to buy as many of the $80 million to $100 million worth of Xerox computers presently on lease as he can.

"I calculated that, based on the trade-in values I have offered users [CW, Oct. 22], the CPUs alone would cost us $6.9 million," he said.

This $6.9 million would be spread out over a period of about seven years, "so it's not really a very big expansion on our part," he said.

"By adding peripherals to it, however, we assumed we would get about 20% of those 150 Xerox systems out there, increasing our business by about 30% per year over the next two years.

However, at this point, Edens is looking for a growth in Xerox business for three years and then a decline for the next four, he said.

"If I could make the business last 10 years, we could have slower growth for a longer period of time," he said.

"My own personal opinion is there is still a high degree of probability that [the Xerox-Honeywell arrangement] will not happen because as I understand it, the agreement is only a letter of intent and it will not take effect until Jan. 1.

However, "this is an area of business in which Honeywell has been very good at in the past . . . it's an extension of its third-party maintenance organization."

"I don't know how many companies it actually does third-party maintenance for, but Data Recall, for example, and some of the people who were in the old core memory business used Honeywell for third-party maintenance," he said.

"If it does go through, Honeywell might even be negotiating with us at some point because we're still out there very aggressively pulling those machines into our lease base, and I expect to pick up some more during those user meetings," he said.

A public company, Telefile shipped an estimated $5 million in equipment for fiscal year ended Sept. 30.

Although the books have not yet been audited, the firm is "profitable," Edens stated.

Because Telefile has had "four very good years of operation," banks are happy to extend cash to finance programs such as the Xerox computer acquisition, Edens said, and even computers from manufacturers that are out of business provide "good solid collateral," he said. "It's just the risk factor that you have to worry about."

In addition to Xerox-compatible equipment, Telefile makes a line compatible to almost every company's, except IBM's equipment, he said.

"We also make communications systems, so Telefile doesn't have to depend on Xerox business to last," he said.

Contracts

Business Systems Technology, Inc. (BST) has received an expanded service contract from Sorbus, Inc. which includes maintenance of BST peripheral product installations in Hawaii.

Compuscan, Inc. has received a contract to manufacture for and sell optical character recognition data entry wands to the First National City Bank of New York. The contract agreement contains provision for payment of royalties by Compuscan to the bank on sales to specified markets once certain sales volumes have been achieved.

Cyphernetica Division of ADP Network Services has received a three-year contract extension from Chase Econometrics Associates, Inc. to provide services covering econometric modeling, forecasting and data base services.

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Moves to Vertical Integration

Data General Adds Home-Grown RAM to Nova 3

By Molly Upton
Of the CW Staff

SOUTHBORO, Mass. – By introducing its home-made N-channel 4K random-access memory (RAM) as a component in its Nova 3 semiconductor memory [CW, Oct. 22], Data General Corp. (DG) has extended its trend toward vertical integration and become one of the first mini makers to reduce the gap between semiconductor houses and mini makers.

Other firms have worked with custom designs of MOS devices made outside their own facilities, but DG's 4K chip is produced in its own Sunnyvale, Calif., facility.

Although DG engineers originally thought in terms of a 22-pin RAM, they decided 20 pins would offer more advantages, according to John Scanlon, marketing specialist for processor products.

With vertical integration, DG's memory engineers worked with its semiconductor designers to specify optimum trade-off points in a system sense with regard to speed, functionality, chip size and ease of use in Nova 3 systems.

In addition to system integration, there is the advantage of increased inventory control, Scanlon said.

The Nova 3 memory is compatible on a board level with Texas Instrument's 22-pin assembly, he added. "If you want a second source, you go with standard parts."

Scanlon would not give performance specifications on the chip except to say the firm is "making conservative use of the chip" in the Nova 3. With semiconductor memory, the Nova 3 has a memory cycle speed of 700 nsec.

"We're pretty proud of the chip," he added.

Although the 4K RAM is currently scheduled for inclusion only in the Nova 3, a general-purpose 4K RAM is "useful," he said.

The only other DG CPU to use semiconductor memory now is the Eclipse series, he said.

DG is providing the chip only for internal use, as opposed to OEM sales, he said.

Most of the MOS memory devices available now are P-channel. N-channel devices give "inherently higher performance," Scanlon said.

Three years ago when DG started its MOS development efforts, N-channel was not known to be easy to control, "but in retroapect we took the right step."

The increase in speed comes from the fact electrons have inherently higher mobility than holes, the firm said. In N-channel technology, switching action is caused by controlling the flow of electrons from source to drain regions, whereas P-channel relies on the movement of holes or absence of electrons to facilitate switching.

Having semiconductor capability ia "mandatory to retain cost structures in the long term," he remarked. DG makes more than the 4K RAM, he added, including the sense amp and clock driver as well as a large proportion of the bipolar transistor-to-transistor logic (TTL) used in computers.

At the low end of the market, where price is critical, in-house capability gives the low-cost supplier flexibility for cost structures, he said.

Using an asynchronous processor, the Nova 3 can handle both core and semiconductor memory, he observed. This should prove useful in applications where users wish to keep the program in core and use the MOS portion for performance, Scanlon added.

"We're interested in how orders will break down" between core, semi and combinations, he said.

Scanlon cited volatility as one problem in gaining user acceptance for MOS, but there is also technological skepticism, he said. The community has seen semiconductor suppliers run into trouble meeting their announced supply schedulea, he explained.

Discounts are by CPU family at DG, so an OEM could retain his discount while choosing from a variety of capacities and technology, either semi or core, he remarked. The Nova 3 has up to 128K.

Aimed at OEM Mart

The Nova 3, aimed at the OEM market, represents a renewed effort on DG's part to answer the question of what the firm is doing for the OEM.

Traditionally DG grew up as an OEM firm, Scanlon said, and then it pursued the end-user market with more system software and the Eclipse.

The trend during the past year has been even more toward the end-user side of the industry.

He observed there is beginning to be an upturn in the OEM market, and "a lot of new OEM commitments are starting," he said.

DG expects the Nova 3 will replace the Nova 2 for new OEM customers. At the low end, about 4K, the Nova 3 is priced about 35% below the Nova 2 and costs about 20% less than the Nova 2 for about 32K, he said.

Major Mainframers to Continue to Shop For Peripherals at Specialty Houses

LOS ANGELES – Major computer manufacturers will continue to buy from "specialty" firms to cut their costs, Ryal Poppa, president of Pertec Corp., told investors here recently.

"The challenge is to manufacture a vital computer peripheral at less than a major manufacturer could produce it himself. That keeps the giants buying from you – not competing.

"Of course, the small firm must be able to build in healthy profit margins, too," he added.

"As some minicomputer manufacturers become more deeply involved in the design and production of end-user systems, the manufacturer reviews the potential of producing his own peripherals," Poppa said.

"He does this because he needs an increasing number of peripherals to offer his customers – and he thinks he can capture 20% to 40% of the system cost – our profit," he said.

Applications More Customized

"However, the manufacturer of computers most often finds computers are becoming more and more customized in their applications. This means he must produce peripherals to do a very specific, narrow job," he observed.

"And in-house manufacturing won't support all of the costs of a specialized product. So, major manufacturers turn to specialists like Pertec.

By supplying many market segments with a given peripheral, we can sustain economic manufacturing volumes with good gross margins," he said.

After Poppa joined Pertec in 1972, product lines were streamlined, costs cut and some significant long-term contracts were negotiated, he said.

"We did this in preparation for a dramatically changing computer industry in the 1970s," Poppa explained. "I expect revolutionary changes to occur in data communications," with telephone lines obsoleted by satellites as a means of data communications.

"Yet, tape drives, disk drives and minicomputers will still be a major, integral part of these vast networks," he predicted.

Poppa said he believes the computer industry is just now entering its adolescence.

"There is tremendous growth yet to come," he forecast.

"In all the years through the end of calendar 1973, about 90,000 minicomputers were shipped. In 1974 alone, there were 50,000 shipped.

"This year, it will total 70,000. Obviously, the growth is exponential, and it doesn't appear to have any clear ending.

"The cost of computers, and particularly minis, are coming down so fast we are finding new applications and a rapidly broadening base."

CDC Switched to Data Services Because of IBM Competition

(Continued from Page 35)

perhaps one of the most successful computers ever built – IBM attorneys asked whether this was the same 6600 IBM has "clobbered."

Norris also said CDC's shift in emphasis from computer manufacturing to data services was based on the belief services such as time-sharing are growing at a faster rate than the large installed business computer systems segment of the industry. CDC has tried to convince customers to use its data services rather than purchase or lease systems made by IBM, Norris said, adding the company has gained customers as a result of this strategy.

Some disagree with the CDC approach, Norris said. As an example, he mentioned those who now see distributed processing that utilizes disbursed minicomputers as a favored approach.

Acquisitions and joint ventures form yet another approach to competing in a marketplace dominated by one company, Norris' testimony indicated.

Commercial Credit Corp. is acknowledged to be CDC's most significant acquisition, Norria said. Without this company, CDC would have been hard-pressed to finance computer leasing, in particular, he said. Commercial Credit helped bring financial stability to CDC in addition to adding new dimensions to the corporation's business strategy, he added.

Through this acquisition, money became available that couldn't be obtained from any other source. By retaining an "A" credit rating, Commercial Credit could borrow at a lower rate of interest and, by thus reducing costs, increase its net income.

When Norris gave a speech to the business school at the University of Minnesota in 1973, CDC and Commercial Credit had combined assets of $4.5 million, IBM attorneys pointed out.

Joint Efforts

Joint ventures are used extensively as a strategy to meet competition successfully in the marketplace as well, Norris said. Currently, CDC has a research grant of $25 million from the Canadian government and a joint venture with the government of Rumania to manufacture some peripheral equipment. It owns a company with NCR and ICL called Computer Peripherals, Inc. that makes magnetic tape unit card readers, printers and mass memories. CDC also owns a company with ICL, Plessy and Nixdorf to manufature semiconductors and a company with Honeywell that manufactures rotating mass storage devices, he said.

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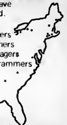

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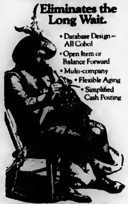

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But Drop 32% in Nine Months

Honeywell Reports Third-Quarter Earnings Rise 29%

MINNEAPOLIS – Honeywell, Inc. reported third-quarter earnings were up 29.1%, but nine-month earnings were down 32.1% for the period ending Sept. 30.

Third-quarter earnings were $14.8 million or 75 cents a share, compared with $11.4 million or 59 cents a share a year ago.

Earnings for the nine months were $32.7 million, or $1.67 a share, compared with $48.1 million or $2.50 a share reported last year.

Total third-quarter revenues were $669.9 million, compared with $621.2 million reported a year ago, and revenues for the nine months were $1.96 billion, a 7.5% increase over the $1.86 billion showing reported last year, the firm said.

Honeywell President Edson W. Spencer said the company was pleased with the improvement in its third-quarter profits, but did not regard the quarter as an indication of a rapid turnaround in its worldwide business.

Cites Improvement Trend

"We are encouraged by the modest improvement trend since the first of the year, which shows profitability in the second and third quarters better than the preceding periods, he said.

Computer rental and service revenues for the quarter were $192.6 million, an 11.7% improvement over results reported a year ago for both the quarter and the nine months, Spencer added. Purchase revenues improved in the third quarter and were slightly ahead of last year's nine-month period, he said.

Net bookings in the computer business in the third quarter were less than the record second quarter, but they were equal to last year's third quarter and continue ahead of 1974 on a year-to-date basis. Backlogs continue ahead of a year ago at this time.

In France, negotiations are continuing on the merger of Compagnie Honeywell Bull with Compagnie Internationale pour l'Informatique and Honeywell hopes these negotiations can be completed this year. If so, the merged company will be in operation by the end of the first quarter.

"The upturn of our third-quarter order pattern in most segments of the company supports our hope that the recession has bottomed out, but it is nevertheless true that economic indicators important to Honeywell's business have shown no sharp upward moves," Spencer said.

Recovery Gradual

"In this period of recovery, many of the inflationary pressures upon Honeywell and its customers remain. It appears economic recovery will be gradual, but we are not disturbed by the pace of the recovery since too rapid a rate would cause more inflation, which we believe continues to be the most serious threat to real growth."

The most positive elements in Honeywell's increased third-quarter profitability were the continuing demand for cost and energy-saving systems for existing commercial buildings that more than offset the low level of new construction in this market, an improved order rate for residential products, considerable demand for process control systems from the power-generation industry and the improved contribution in operating results from the company's computer business, Spencer said.

Memorex Quarter Net Rises On 19% Increase in Sales

SANTA CLARA, Calif. – Memorex Corp. reported sharply improved earnings on a 19% increase in revenues during the third quarter and a switch to $12.2 million in earnings for the nine months compared with a loss of $6.4 million during the year-ago period.

President Robert C. Wilson said the outright sale of equipment and the conversion of leased equipment to sale continued to contribute significantly to revenue growth and to the improved profit and cash performance.

He also cited cost-improvement actions throughout the company and declining interest costs as significant factors.

For the third quarter, earnings jumped to $4.4 million or 91 cents a share, including a $1.7 million tax credit, compared with earnings of $513,000 or 12 cents a share in the same period last year.

Although there were no extraordinary credits in the same 1974 period, about $900,000 was credited to 1974 results because of a reversal of interest expense that had been charged to second-querter operations, the company said.

Revenues for the quarter reached almost $67 million compared with $56.2 million in the year-ago period.

During the nine months, there was a $7.1 million special credit, including debenture purchase and tax credits.

Revenues for the nine months rose to $194.2 million compared with $158.1 million in the same period last year.

Wilson said the company's cash and short-term investments were $29.1 million as of Sept. 30, an improvement of $8.6 million during the quarter.

Indebtedness to senior lenders was reduced by $16.9 million during the quarter and now aggregates $127 million.

Shareholders' deficiency has decreased from $23.7 million on Dec. 31 to $4.5 million on Sept. 30, Wilson said.

The major factors in reducing shareholders' deficiency were the favorable profit performance, the exchange of debt for preferred stock and the ability to satisfy interest obligations to senior lenders by the issuance of preferred stock, Wilson said.

Calcomp Loss of $12.4 Million For Year Attributed to Write-Offs

ANAHEIM, Calif. – California Computer Products Inc. (Calcomp) showed a loss of $12.4 million for the year. About two-thirds of the loss was attributable to the write-off of investments and abandoned product lines, principally advances in anticipation of an agreement to purchase the Braegen Corp., a terminal maker, President Lester L. Kilpatrick said.

Revenues also dropped for the year ended June 30 to $122.9 million compared with $129.9 million last year.

The loss of $12.4 million or $3.83 a share compared with earnings of $8.7 million or $2.84 a share last year when there was a $3.3 million tax credit.

"It became evident in a tight money market that capital required to make the acquisition [of Braegen] profitable in the long term could be more judiciously used elsewhere," Kilpatrick said.

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Earnings Reports

ALGOREX DATA
Year Ended June 30

	1975	a1974
Shr Ernd	.....	$.07
Revenue	$1,682,099	2,132,819
Tax Cred	.....	85,000
Earnings	(205,705)	129,208

a-Restated for accounting change.

KALVAR
Three Months Ended July 5

	1975	a1974
Revenue	$2,259,270	$1,843,722
Disc Op	(32,883)	48,902
Loss	123,373	123,339

a-For 14 weeks.

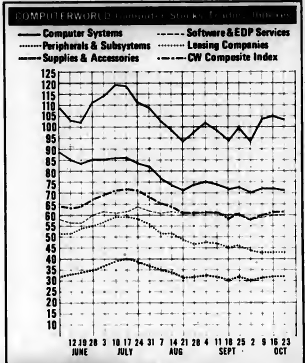
KEYDATA
Year Ended July 31

	1975	1974
Shr Ernd	$.17	.....
Revenue	13,478,000	$11,870,000
Spec Item	a200,000	b(2,405,000)
Earnings	452,000	(2,992,000)

a-From tax-loss carryforward. b-From change in accounting method.

NATIONAL SEMICONDUCTOR
Four Months Ended Sept. 21

	1975	1974
Shr Ernd	$.40	$.46
Revenue	82,386,000	75,120,000
Earnings	5,241,000	5,508,000


COMPUTERWORLD Computer Stocks Trading Indexes

NATIONAL DATA
Three Months Ended Aug. 31

	1975	1974
Shr Ernd	$.09	$.08
Revenue	8,308,000	7,595,000
Earnings	482,000	420,000

REDACTRON
Year Ended June 30

	1975	1974
Shr Ernd	.....	$.34
Revenue	$19,747,315	18,223,900
Tax Cred	.....	192,000
Earnings	(1,285,882)	402,098

DIGITAL COMPUTER CONTROLS
Three Months Ended Aug. 31

	1975	1974
Shr Ernd	$.08	$.03
Revenue	2,504,081	2,835,000
Earnings	118,458	53,101
8 Mo Shr	.13	.08
Revenue	4,843,454	4,956,883
Earnings	207,920	94,945

ANACOMP
Year Ended June 30

	a1975	1974
Shr Ernd	$1.11	$.78
Revenue	8,922,391	8,031,078
Tax Cred	370,031	253,000
Earnings	884,914	528,775
3 Mo Shr	.38	.28
Revenue	3,134,358	2,095,961
Tax Cred	120,031	98,000
Earnings	318,808	194,056

a-Preliminary; includes results of EDP Corp. acquired March 1975 on a purchase basis.

ANALOG DEVICES
Three Months Ended Aug. 2

	1975	a1974
Shr Ernd	$.25	b$.31
Revenue	7,548,408	8,157,410
Earnings	374,904	444,341
9 Mo Shr	.87	b.88
Revenue	22,293,718	22,249,816
Earnings	967,893	1,248,389

a-Restated to reflect change to Lifo accounting method for certain inventories. b-Adjusted to reflect 5% stock dividend in March 1975.

WESTERN DIGITAL
Year Ended June 30

	1975	1974
Shr Ernd	.....	$1.84
Revenue	$11,810,000	13,388,000
Spec Cred	.....	723,000
Earnings	(3,515,000)	2,200,000
3 Mo Shr	.....	.79
Revenue	3,212,000	5,171,000
Spec Cred	.....	278,000
Earnings	(2,057,000)	1,053,000

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Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, OCTOBER 22, 1975

All statistics compiled, computed and formatted by
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COMPUTER SYSTEMS

EXCH		PRICE 1975 RANGE (1)	CLOSE OCT 22 1975	WEEK NET CHNGE	WEEK PCT CHNGE
N	BURROUGHS CORP	82-109	87 7/8	-3 1/8	-3.4
O	COMPUTER AUTOMATION	2- 10	10 3/8	+ 1/8	+1.2
N	CONTROL DATA CORP	11- 23	19 3/8	- 7/8	-4.3
N	DATA GENERAL CORP	10- 38	37 5/8	- 1/2	-1.3
O	DATAPOINT CORP	6- 26	24	0	0.0
O	DIGITAL COMP CONTROL	1- 4	2 3/4	0	0.0
N	DIGITAL EQUIPMENT	46-135	129 3/8	-2 1/8	-1.8
N	ELECTRONIC ASSOC.	2- 3	1 3/4	- 3/8	-17.6
R	ELECTRONIC ENGINEER.	5- 10	8 5/8	- 1/4	-2.8
N	FOXBORO	23- 42	27 5/8	- 1/2	-1.7
O	GENERAL AUTOMATION	4- 14	4 1/8	- 1/2	-10.8
C	GRI COMPUTER CORP	1- 1	5/8	0	0.0
N	HEWLETT-PACKARD CO	58-120	101 1/4	- 3/8	-0.3
N	HONEYWELL INC	22- 40	34 1/8	+2 1/4	+7.0
N	IBM	158-224	213 1/4	+4 1/2	+2.1
O	MEMOREX	1- 10	8 7/8	- 5/8	-6.5
O	MICRODATA CORP	2- 6	5 3/4	- 1/8	-2.1
C	MODULAR COMPUTER SYS	5- 19	10 1/4	-1	-8.8
N	NCR	15- 39	25 3/8	+1	+4.1
O	PRIME COMPUTER INC	2- 6	5	+ 1/4	+5.2
N	PERKIN-ELMER	16- 30	26 5/8	+ 7/8	+3.3
N	RAYTHEON CO	28- 59	55	-1 1/8	-2.0
N	SINGER COMPANY	10- 17	11 7/8	+ 1/8	+1.0
N	SPERRY RAND	26- 49	42 7/8	+ 1/4	+0.5
A	SYSTEMS ENG. LABS	1- 5	2 7/8	- 1/4	-8.0
N	VARIAN ASSOCIATES	7- 18	15 3/8	+ 7/8	+8.0
A	WANG LABS.	7- 17	11 1/4	- 1/8	-1.0
N	XEROX CORP	51- 88	58 5/8	-3 1/8	-5.0

LEASING COMPANIES

EXCH		PRICE 1975 RANGE (1)	CLOSE OCT 22 1975	WEEK NET CHNGE	WEEK PCT CHNGE
O	COMDISCO INC	1- 5	2 1/2	- 3/4	-25.0
A	COMMERCE GROUP CORP	2- 4	2 1/2	- 1/8	-4.7
A	COMPUTER INVSTRS GRP	1- 2	5/8	+	+10.0
N	DATRONIC RENTAL	1- 1	1/2	0	0.0
A	DCL INC	0- 1	3/8	-	-14.3
N	DPF INC	3- 6	4 1/2	0	0.0
O	EDP RESOURCES	1- 2	1	0	0.0
R	GRANITE MGT	1- 5	4 1/8	0	0.0
A	GREYHOUND COMPUTER	2- 3	2 1/2	- 1/8	-4.7
A	ITEL	3- 9	6 7/8	+ 3/8	+5.7
N	LEASCO CORP	4- 8	7	+ 1/4	+3.7
O	LEASPAC CORP	0- 0	1/4	0	0.0
O	LECTRO MGT INC	1- 1	1/8	0	0.0
O	MRG INC	0- 4	1/2	0	0.0
A	PIONEER TEX CORP	2- 7	6 5/8	+1	+17.7
R	ROCKWOOD COMPUTER	1- 1	1/8	0	0.0
N	U.S. LEASING	7- 14	8 3/8	+ 1/4	+3.0

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 5 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

SOFTWARE & EDP SERVICES

EXCH		PRICE 1975 RANGE (1)	CLOSE OCT 22 1975	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	1- 1	7/8	0	0.0
A	APPLIED DATA RES.	1- 10	1 1/2	- 1/4	-14.2
N	AUTOMATIC DATA PROC	29- 65	59 7/8	+ 1/2	+0.8
O	BRANDON APPLIED SYST	1- 1	1/8	0	0.0
O	CENTRAL DATA SYSTEMS	3- 7	7 3/8	0	0.0
O	COMPUTER DIMENSIONS	2- 6	5	0	0.0
O	COMP ELECTION SYSTMS	3- 7	6 3/4	+ 3/4	+12.5
C	COMPUTER HORIZONS	1- 1	3/4	- 1/4	-25.0
O	COMPUTER NETWORK	1- 3	3 1/8	+ 1/4	+8.6
N	COMPUTER SCIENCES	2- 6	5	0	0.0
C	COMPUTER TASK GROUP	1- 1	5/8	0	0.0
O	COMPUTER USAGE	2- 4	2 1/8	- 1/8	-5.5
O	COMSHARE	3- 4	2 5/8	- 1/8	-4.5
O	DATATAB	1- 2	7/8	0	0.0
A	ELECT COMP PROG	1- 1	1/8	0	0.0
N	ELECTRONIC DATA SYS.	12- 28	14 7/8	- 1/4	-1.8
O	INFONATIONAL INC	1- 1	1/8	0	0.0
C	IPS COMPUTER MARKET.	1- 1	5/8	0	0.0
O	KEANE ASSOCIATES	2- 3	2 3/8	0	0.0
O	KEYDATA CORP	2- 3	2	0	0.0
O	LOGICON	3- 5	3 1/2	0	0.0
R	MANAGEMENT DATA	1- 3	1 3/4	- 1/8	-6.8
O	NATIONAL CSS INC	6- 14	11 1/2	- 1/8	-1.0
O	NATIONAL COMPUTER [illegible]	1- 1	1/8	0	0.0
A	ON LINE SYSTEMS INC	8- 17	12 1/4	-1 1/4	-9.2
N	PLANNING RESEARCH	2- 8	3 5/8	- 1/8	-3.3
O	PROGRAMMING & SYS	1- 1	5/8	0	0.0
O	RAPIDATA INC	2- 5	3 5/8	+ 3/4	+26.0
O	REYNOLDS & REYNOLDS	10- 24	15 1/2	+2	+14.8
O	SCIENTIFIC COMPUTERS	1- 1	1	0	0.0
O	SIMPLICITY COMPUTER	1- 1	1 1/8	0	0.0
O	TYMSHARE INC	7- 21	19 1/8	+ 5/8	+3.5
R	URS SYSTEMS	2- 4	3	0	0.0
N	WYLY CORP	2- 4	5	0	0.0

PERIPHERALS & SUBSYSTEMS

EXCH		PRICE 1975 RANGE (1)	CLOSE OCT 22 1975	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADDRESSOGRAPH-MULT	4- 9	8 1/8	0	0.0
O	ADVANCED MEMORY SYS	1- 7	5 1/2	0	0.0
N	AMPEX CORP	3- 7	5 1/2	- 1/8	-2.2
O	ANDERSON JACOBSON	1- 3	2	+ 1/4	+14.2
O	BEEHIVE MEDICAL ELEC	1- 5	3 1/2	+ 1/8	+3.7
A	BOLT,BERANEK & NEW	5- 13	9	- 1/8	-1.3
N	BUNKER-RAMO	4- 8	4 3/4	- 1/4	-5.0
R	CALCOMP	4- 7	4 1/4	+ 1/2	+13.3
O	CAMBRIDGE MEMORIES	2- 5	2 5/8	0	0.0
N	CENTRONICS DATA COMP	7- 25	17 7/8	-1	-5.2
O	CODEX CORP	19- 38	35 1/2	+ 1/2	+1.4
O	COGNITRONICS	1- 2	3/4	0	0.0
O	COMPUTER COMMUN.	1- 2	5/8	- 1/8	-16.6
O	COMPUTER CONSOLES	3- 7	4 1/4	+ 1/4	+6.2
R	COMPUTER EQUIPMENT	1- 2	1 5/8	+ 1/8	+8.5
O	COMPUTER MACHINERY	1- 2	1	0	0.0
C	COMPUTER TRANSCEIVER	1- 2	7/8	+ 1/4	+40.0
O	COMTEN	2- 5	3 3/8	+ 1/4	+7.4
N	CONRAC CORP	12- 26	25 1/2	+2 1/4	+9.6
O	DATA ACCESS SYSTEMS	1- 5	1 1/4	0	0.0
O	DATA 100	5- 16	10 1/8	- 5/8	-5.8
A	DATA PRODUCTS CORP	2- 6	3 7/8	+ 1/8	+3.3
O	DATA TECHNOLOGY	1- 3	1 1/2	+ 1/8	+9.0
O	DATUM INC	1- 2	7/8	- 1/8	-12.5
O	DECISION DATA COMPUT	4- 7	3 5/8	- 3/8	-9.3
O	DELTA DATA SYSTEMS	1- 1	1/4	0	0.0
C	DI/AN CONTROLS	1- 1	3/4	0	0.0
N	ELECTRONIC M & M	1- 3	1 5/8	+ 1/8	+8.3
O	FABRI-TEK	1- 1	7/8	0	0.0
O	GENERAL COMPUTER SYS	1- 2	1	0	0.0
N	HAZELTINE CORP	3- 6	3 1/2	- 1/4	-8.6
N	HARRIS CORP	18- 28	28 1/4	+2	+7.6
A	INCOTERM CORP	3- 12	9 1/4	- 3/4	-7.5
C	INFOREX INC	2- 5	2 3/4	- 1/8	-4.3
O	INFORMATION INTL INC	8- 14	13 1/2	- 1/4	-1.8
A	LUNDY ELECTRONICS	3- 3	2 7/8	0	0.0
O	MANAGEMENT ASSIST	1- 1	3/8	0	0.0
A	MILGO ELECTRONICS	8- 24	16 1/4	-1	-5.7
A	MOHAWK DATA SCI	1- 5	3 1/8	- 3/8	-10.7
O	OPTICAL SCANNING	1- 3	2 5/8	0	0.0
O	PENRIL CORP	2- 2	1 1/4	+ 1/2	+66.8
C	PERTEC CORP	2- 8	4 1/2	0	0.0
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
C	PRECISION INST.	1- 1	1/4	0	0.0
O	QUANTOR CORP	2- 8	3 3/4	- 3/8	-9.0
O	RECOGNITION EQUIP	2- 9	6 1/2	- 3/4	-10.3
N	SANDERS ASSOCIATES	3- 11	7 1/2	- 1/4	-3.2
C	SCAN DATA	1- 3	1 5/8	0	0.0
C	STORAGE TECHNOLOGY	6- 17	13 1/2	- 1/2	-3.5
O	SYCOR INC	5- 16	16 1/4	+1 1/2	+10.1
C	T BAR INC	3- 6	A	- 1/4	-4.0
O	TALLY CORP.	1- 5	3 1/8	0	0.0
O	TEC INC	1- 4	5	0	0.0
N	TEKTRONIX INC	18- 43	41	+1 1/2	+3.7
N	TELEX	1- 3	2	- 1/2	-20.0
O	WANGCO INC	4- 9	6 7/8	- 5/8	-8.5
O	WILTEK INC	1- 4	2 1/2	0	0.0

SUPPLIES & ACCESSORIES

EXCH		PRICE 1975 RANGE (1)	CLOSE OCT 22 1975	WEEK NET CHNGE	WEEK PCT CHNGE
O	BALTIMORE BUS FORMS	4- 5	4 1/2	0	0.0
A	BARRY WRIGHT	5- 7	5 3/8	- 5/8	-10.4
O	CYBERMATICS INC	0- 1	5/8	0	0.0
R	DATA DOCUMENTS	29- 42	31	- 3/4	-2.5
O	DUPLEX PRODUCTS INC	12- 25	15 1/4	- 1/4	-1.6
N	ENNIS BUS. FORMS	5- 7	4 7/8	0	0.0
O	GRAHAM MAGNETICS	5- 10	8 1/2	+ 1/2	+6.2
O	GRAPHIC CONTROLS	8- 21	15 1/4	+ 1/4	+1.9
N	3M COMPANY	43- 68	59 1/4	+1 1/4	+2.1
O	MOORE CORP LTD	59- 51	44 1/2	- 1/4	-0.5
N	NASHUA CORP	10- 22	9 3/4	-1 7/8	-16.1
O	STANDARD REGISTER	11- 20	16	0	0.0
O	TAB PRODUCTS CO	4- 8	5	0	0.0
N	UARCO	17- 24	19	+ 1/2	+2.7
C	VANIER GRAPHICS CORP	4- 7	4 1/2	0	0.0
A	WABASH MAGNETICS	3- 5	4 1/8	+ 1/8	+3.1
N	WALLACE BUS FORMS	19- 25	16 5/8	- 1/4	-1.6

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